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Mochizuki

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(45) **Date of Patent: Sep. 27, 2016**

(54) **PRINTER, PRINT CONTROL DEVICE, PRINT SYSTEM, PRINTING METHOD, AND COMPUTER-READABLE MEDIUM FOR PROVIDING SPECIFIC PRINT SETTING INFORMATION**

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(22) Filed: **Mar. 12, 2014**

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(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**
G06K 15/02 (2006.01)

(52) **U.S. Cl.**
CPC ***G06K 15/1806*** (2013.01); ***G06K 15/1819*** (2013.01); *G06K 15/1818* (2013.01)

(58) **Field of Classification Search**
CPC G06K 15/1806; G06K 15/1819; G06K 15/1818
See application file for complete search history.

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(57) **ABSTRACT**

A printer includes a first receiver, a second receiver, a specifying unit, and a printing unit. The first receiver receives, from any of at least one print instruction information holding device that holds print instruction information giving instructions to print, specific print instruction information associated with a first identifier and instructing the printer to print. The second receiver receives, from a print settings information holding device that holds print settings information indicating settings for printing, specific print settings information associated with a second identifier and indicating settings for printing by the printer. The specifying unit, on the basis of the first identifier and the second identifier, specifies the specific print settings information as print settings information corresponding to the specific print instruction information. The printing unit uses the specific print settings information to conduct printing based on the specific print instruction information.

5 Claims, 16 Drawing Sheets

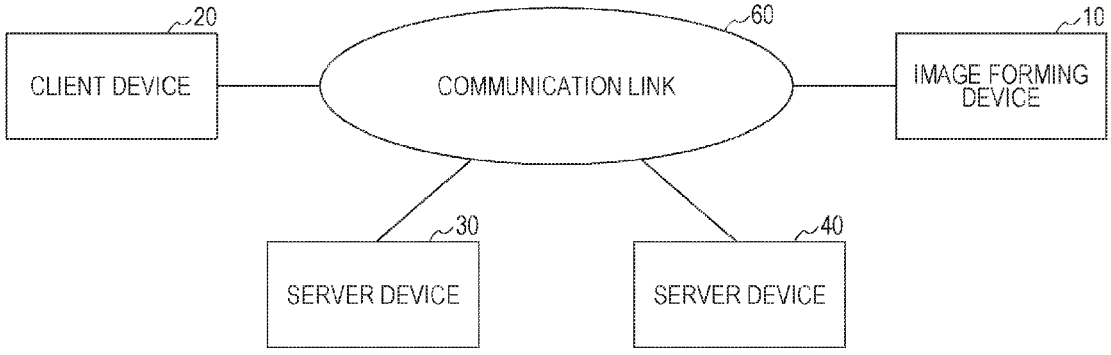


FIG. 1

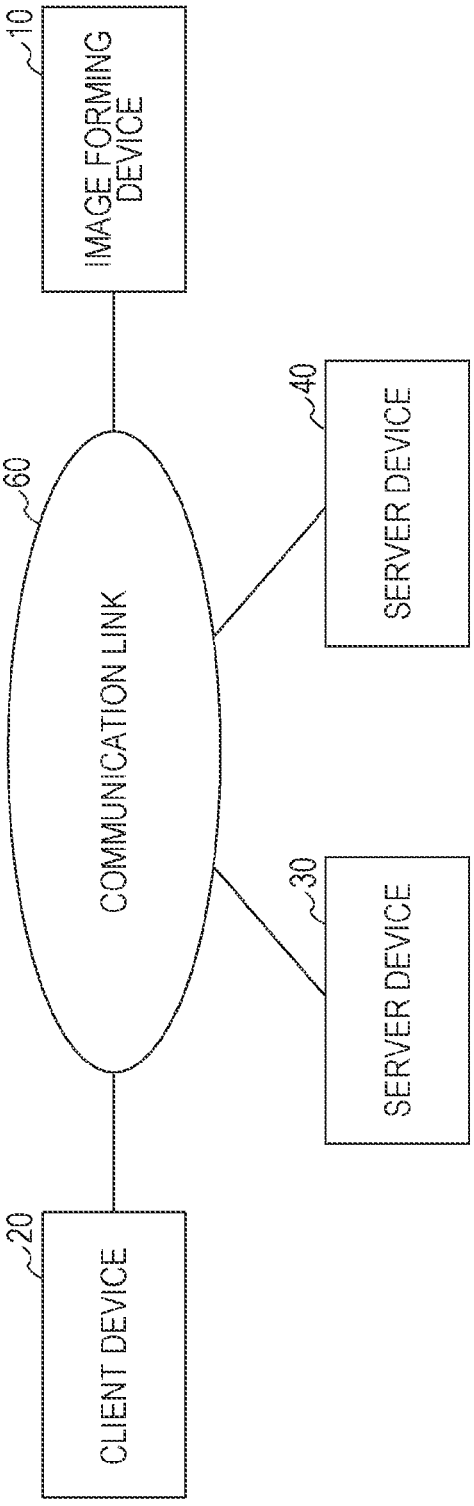

10
IMAGE FORMING DEVICE
40
SERVER DEVICE
60
COMMUNICATION LINK
30
SERVER DEVICE
20
CLIENT DEVICE

FIG. 2

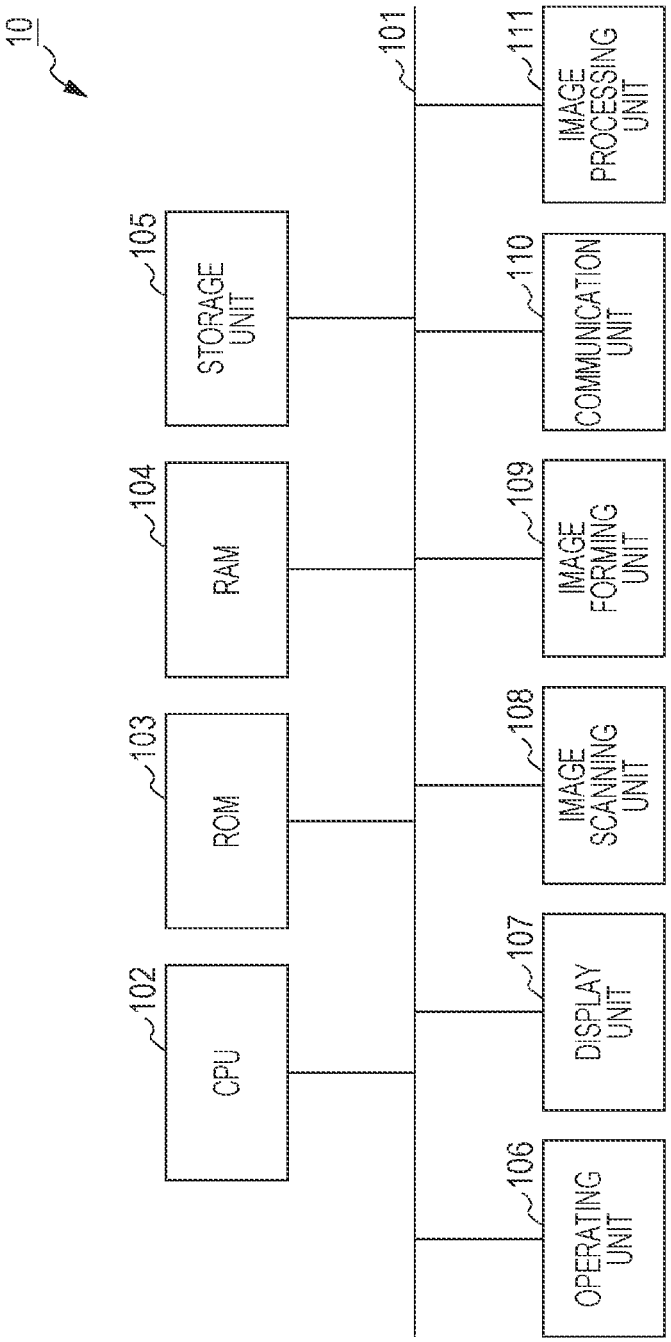

10
101
102
CPU
103
ROM
104
RAM
105
STORAGE UNIT
106
OPERATING UNIT
107
DISPLAY UNIT
108
IMAGE SCANNING UNIT
109
IMAGE FORMING UNIT
110
COMMUNICATION UNIT
111
IMAGE PROCESSING UNIT

FIG. 3

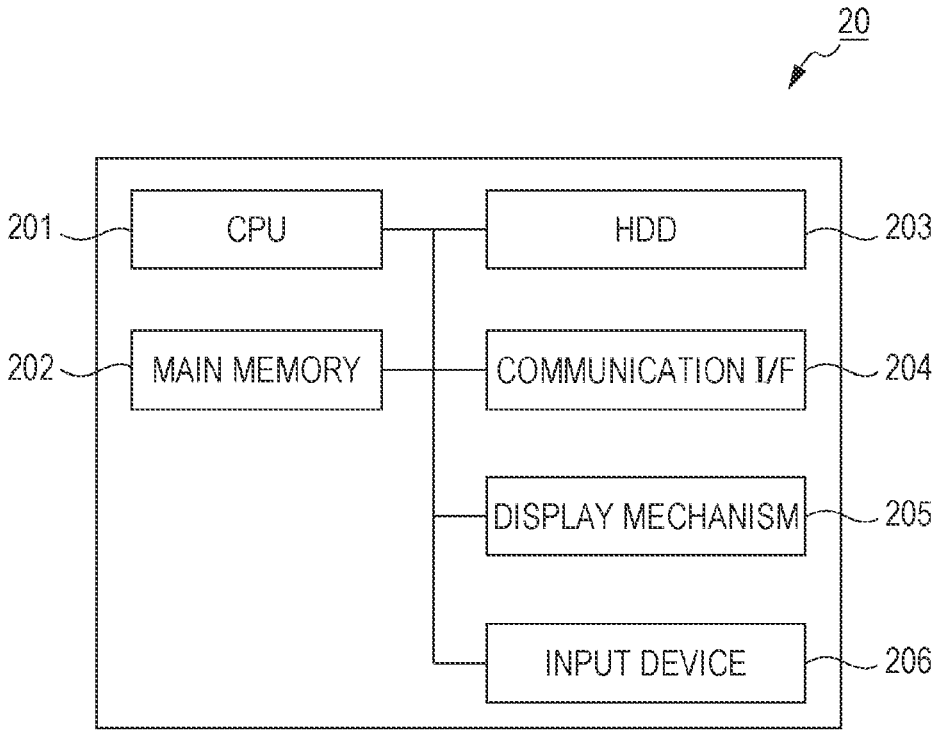
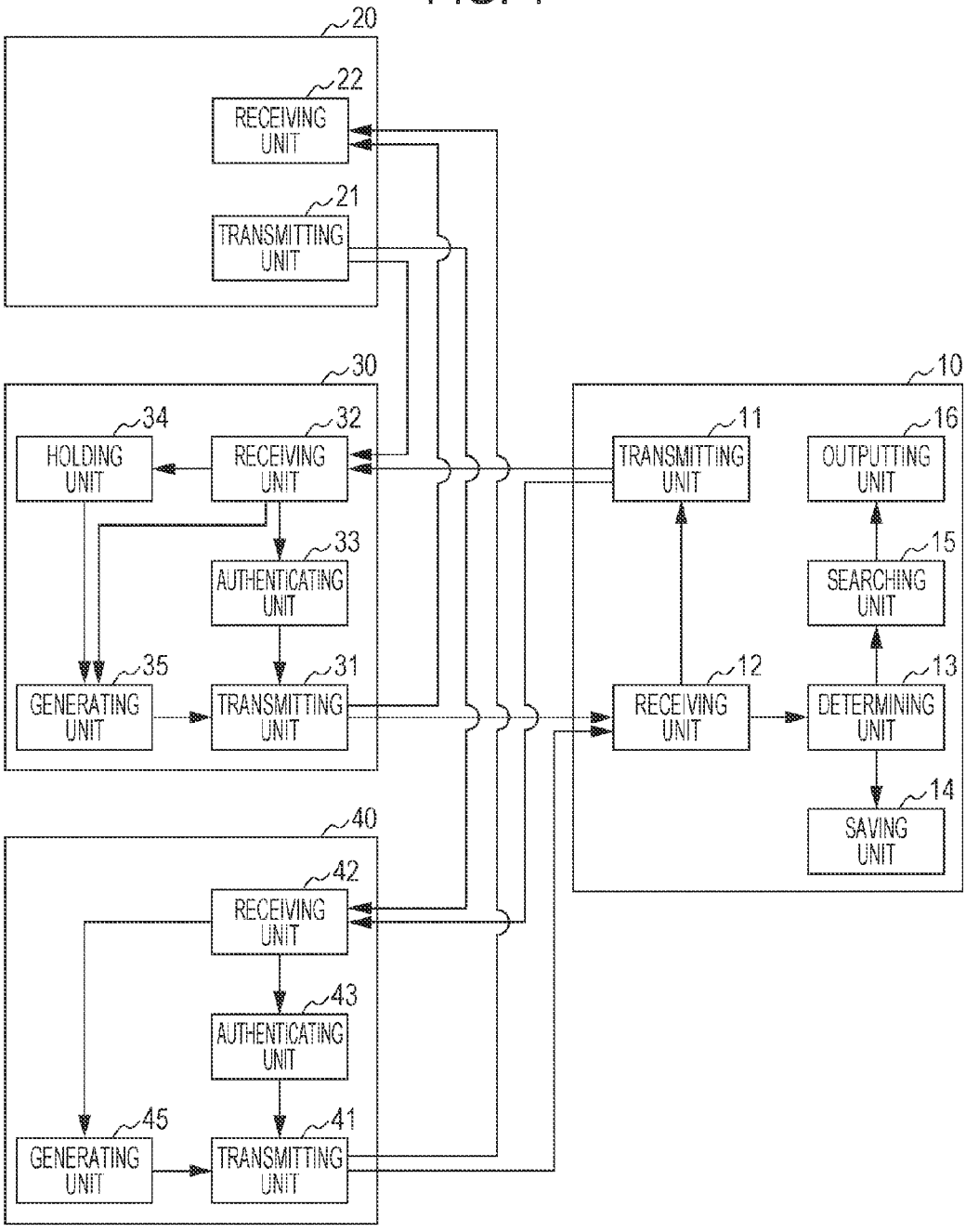

20
201
CPU
HDD
203
202
MAIN MEMORY
COMMUNICATION I/F
204
DISPLAY MECHANISM
205
INPUT DEVICE
206

FIG. 4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22
RECEIVING UNIT
21
TRANSMITTING UNIT
30
34
HOLDING UNIT
32
RECEIVING UNIT
33
AUTHENTICATING UNIT
35
GENERATING UNIT
31
TRANSMITTING UNIT
10
11
TRANSMITTING UNIT
16
OUTPUTTING UNIT
15
SEARCHING UNIT
12
RECEIVING UNIT
13
DETERMINING UNIT
14
SAVING UNIT
40
42
RECEIVING UNIT
43
AUTHENTICATING UNIT
45
GENERATING UNIT
41
TRANSMITTING UNIT

FIG. 5

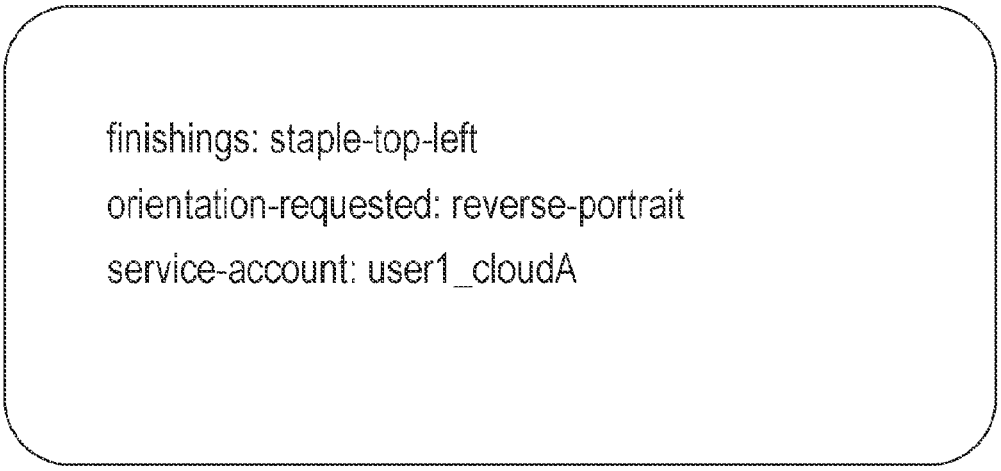

finishings: staple-top-left
orientation-requested: reverse-portrait
service-account: user1_cloudA

FIG. 6

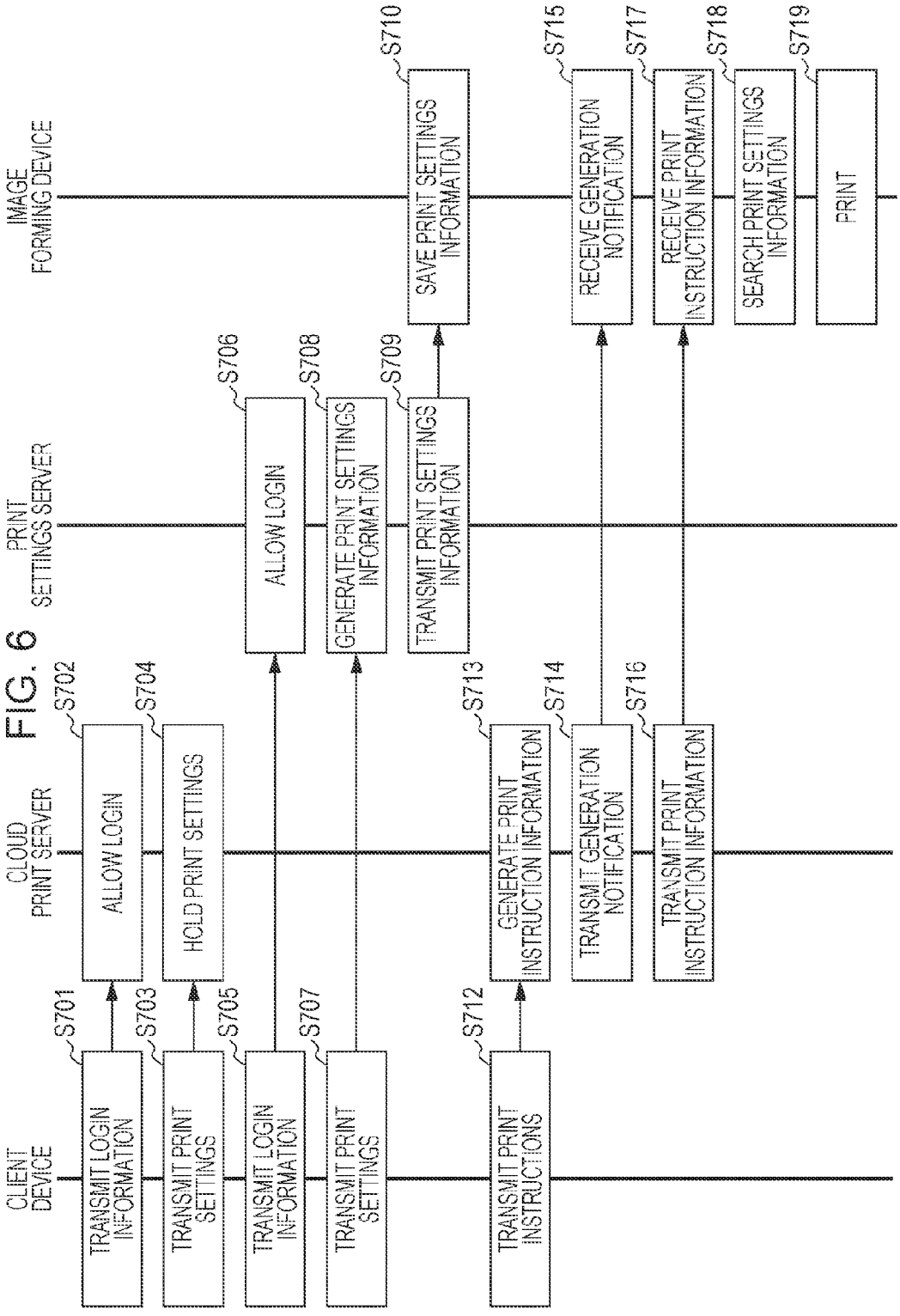

CLIENT DEVICE
CLOUD PRINT SERVER
PRINT SETTINGS SERVER
IMAGE FORMING DEVICE
TRANSMIT LOGIN INFORMATION
S701
ALLOW LOGIN
S702
TRANSMIT PRINT SETTINGS
S703
HOLD PRINT SETTINGS
S704
TRANSMIT LOGIN INFORMATION
S705
ALLOW LOGIN
S706
TRANSMIT PRINT SETTINGS
S707
GENERATE PRINT SETTINGS INFORMATION
S708
TRANSMIT PRINT SETTINGS INFORMATION
S709
SAVE PRINT SETTINGS INFORMATION
S710
TRANSMIT PRINT INSTRUCTIONS
S712
GENERATE PRINT INSTRUCTION INFORMATION
S713
TRANSMIT GENERATION NOTIFICATION
S714
RECEIVE GENERATION NOTIFICATION
S715
TRANSMIT PRINT INSTRUCTION INFORMATION
S716
RECEIVE PRINT INSTRUCTION INFORMATION
S717
SEARCH PRINT SETTINGS INFORMATION
S718
PRINT
S719

FIG. 7

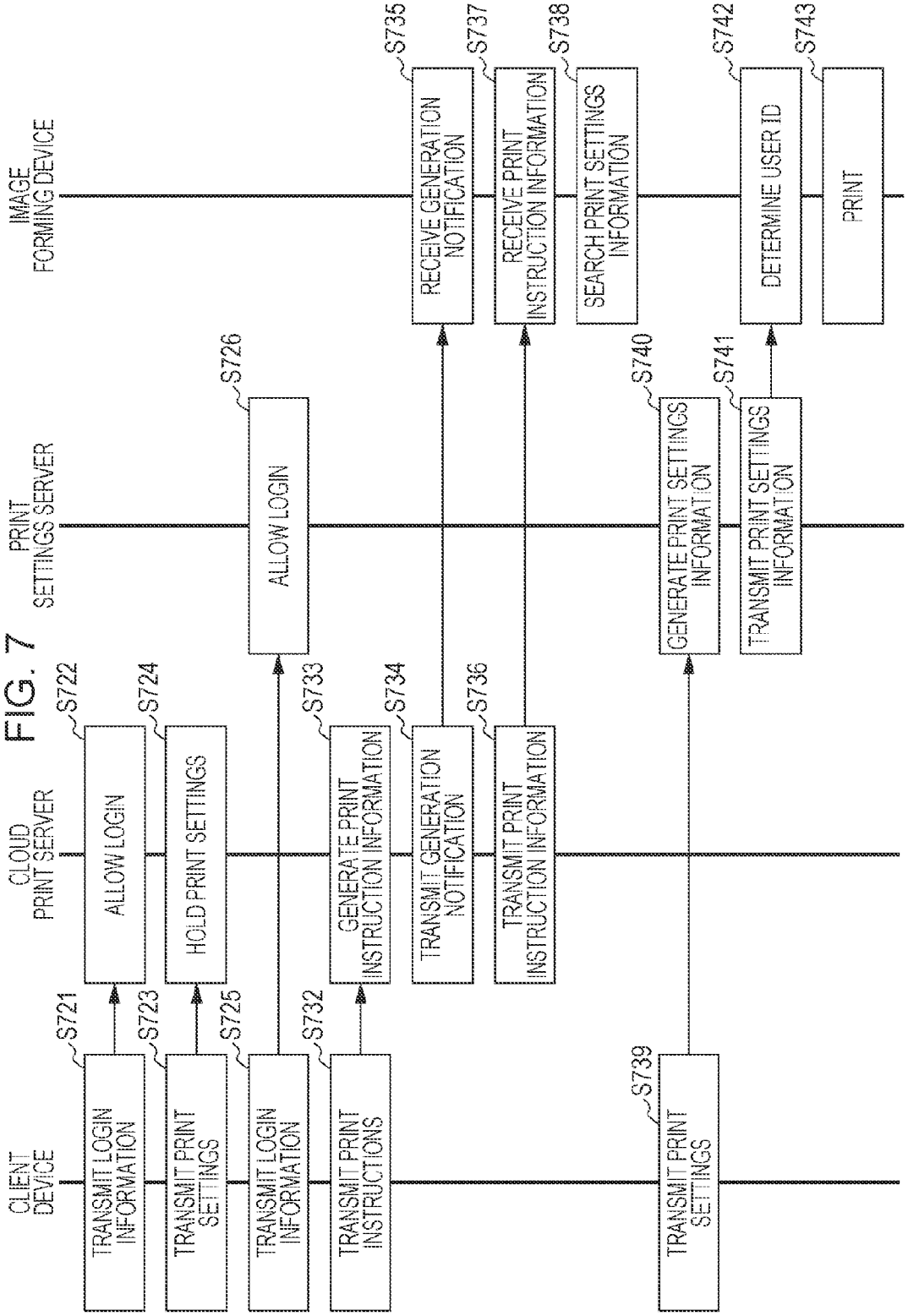

CLIENT DEVICE
CLOUD PRINT SERVER
PRINT SETTINGS SERVER
IMAGE FORMING DEVICE
TRANSMIT LOGIN INFORMATION
S721
ALLOW LOGIN
S722
TRANSMIT PRINT SETTINGS
S723
HOLD PRINT SETTINGS
S724
TRANSMIT LOGIN INFORMATION
S725
ALLOW LOGIN
S726
TRANSMIT PRINT INSTRUCTIONS
S732
GENERATE PRINT INSTRUCTION INFORMATION
S733
TRANSMIT GENERATION NOTIFICATION
S734
RECEIVE GENERATION NOTIFICATION
S735
TRANSMIT PRINT INSTRUCTION INFORMATION
S736
RECEIVE PRINT INSTRUCTION INFORMATION
S737
SEARCH PRINT SETTINGS INFORMATION
S738
TRANSMIT PRINT SETTINGS
S739
GENERATE PRINT SETTINGS INFORMATION
S740
TRANSMIT PRINT SETTINGS INFORMATION
S741
DETERMINE USER ID
S742
PRINT
S743

FIG. 8

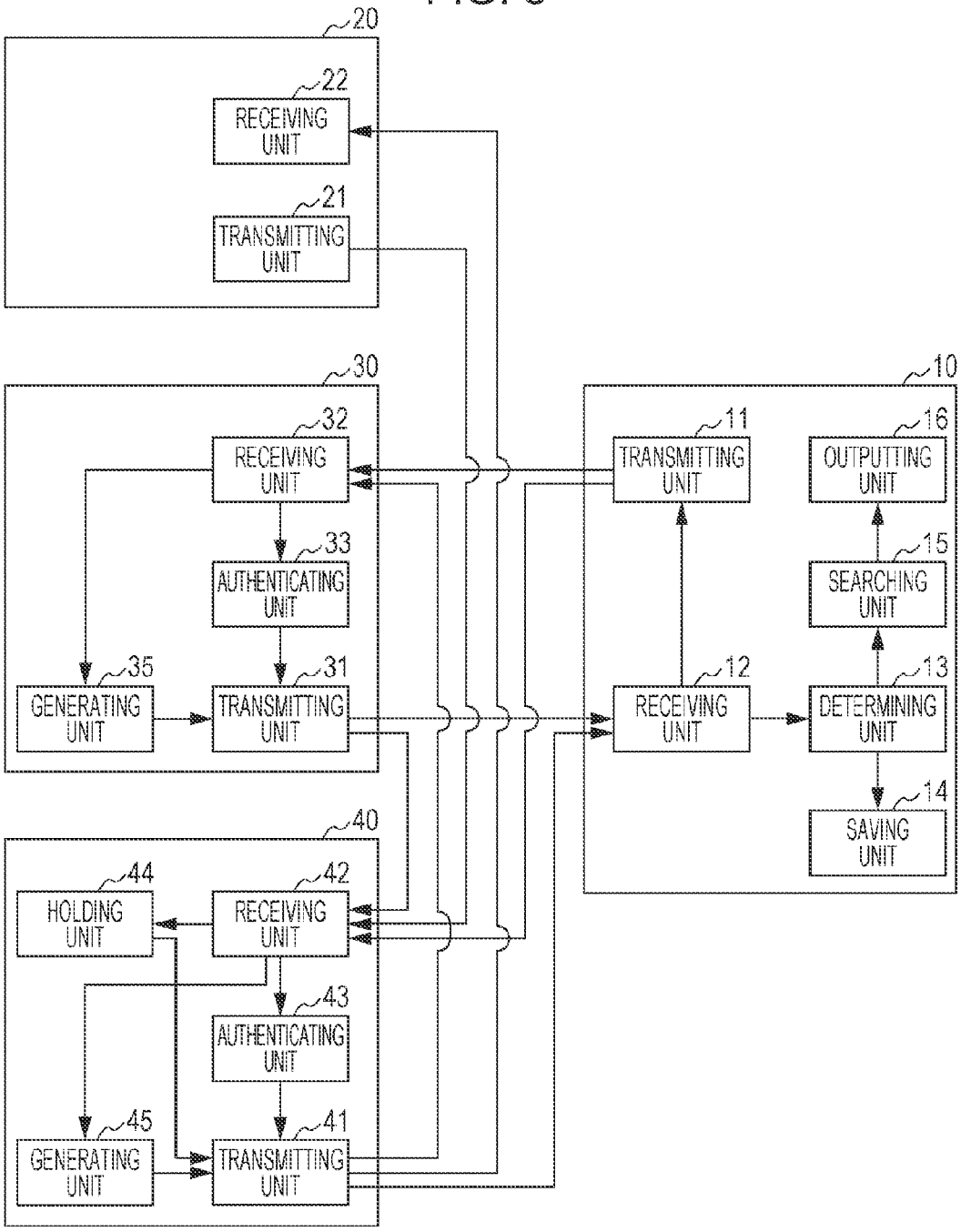

20
22
RECEIVING UNIT
21
TRANSMITTING UNIT
30
32
RECEIVING UNIT
33
AUTHENTICATING UNIT
35
GENERATING UNIT
31
TRANSMITTING UNIT
40
44
HOLDING UNIT
42
RECEIVING UNIT
43
AUTHENTICATING UNIT
45
GENERATING UNIT
41
TRANSMITTING UNIT
10
11
TRANSMITTING UNIT
16
OUTPUTTING UNIT
15
SEARCHING UNIT
12
RECEIVING UNIT
13
DETERMINING UNIT
14
SAVING UNIT

FIG. 9

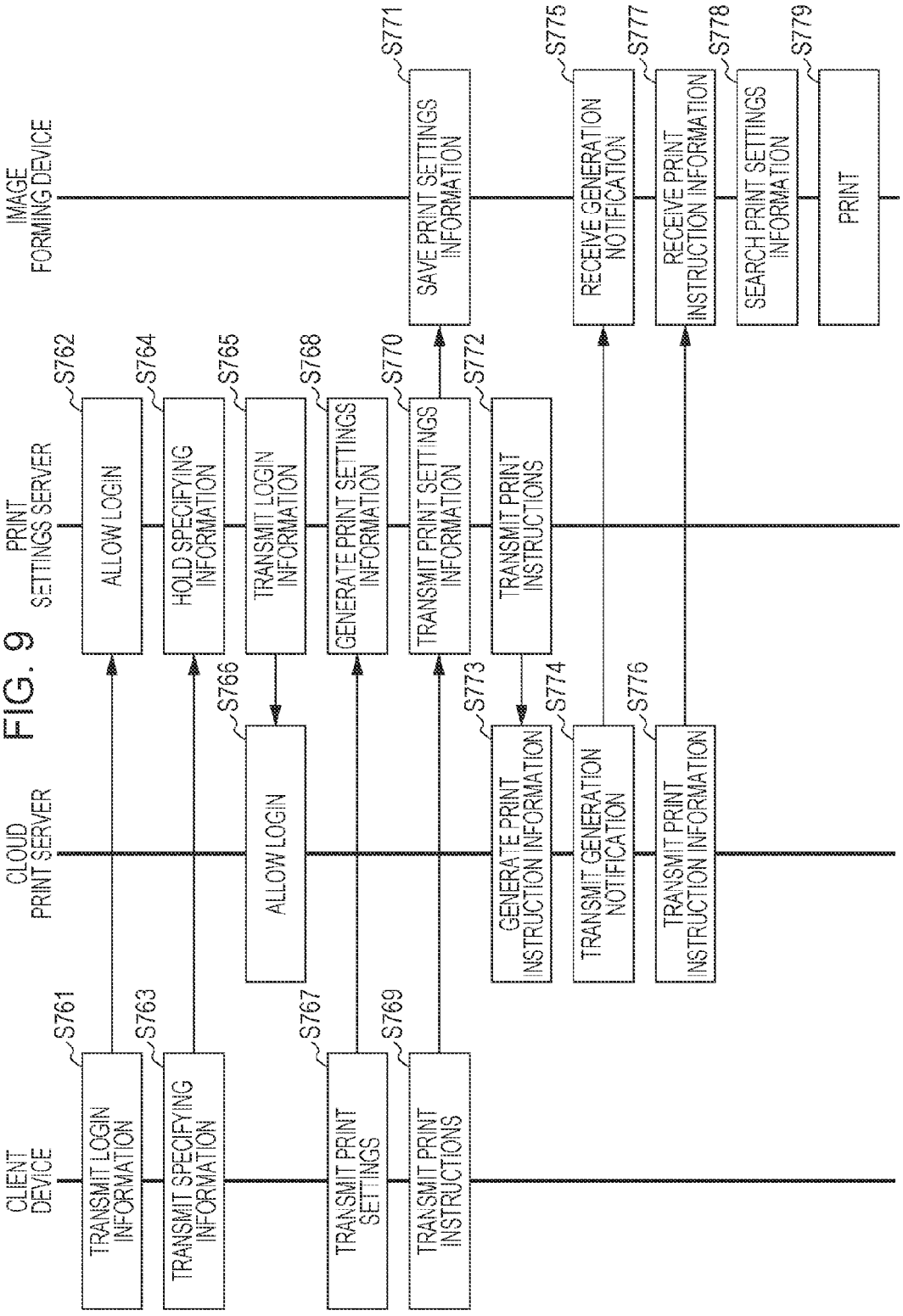

CLIENT DEVICE
CLOUD PRINT SERVER
PRINT SETTINGS SERVER
IMAGE FORMING DEVICE
S761
TRANSMIT LOGIN INFORMATION
S762
ALLOW LOGIN
S763
TRANSMIT SPECIFYING INFORMATION
S764
HOLD SPECIFYING INFORMATION
S765
TRANSMIT LOGIN INFORMATION
S766
ALLOW LOGIN
S767
TRANSMIT PRINT SETTINGS
S768
GENERATE PRINT SETTINGS INFORMATION
S769
TRANSMIT PRINT INSTRUCTIONS
S770
TRANSMIT PRINT SETTINGS INFORMATION
S771
SAVE PRINT SETTINGS INFORMATION
S772
TRANSMIT PRINT INSTRUCTIONS
S773
GENERATE PRINT INSTRUCTION INFORMATION
S774
TRANSMIT GENERATION NOTIFICATION
S775
RECEIVE GENERATION NOTIFICATION
S776
TRANSMIT PRINT INSTRUCTION INFORMATION
S777
RECEIVE PRINT INSTRUCTION INFORMATION
S778
SEARCH PRINT SETTINGS INFORMATION
S779
PRINT

FIG. 10

```
finishings: staple-top-left
orientation-requested: reverse-portrait
print-service-url: http://cloud-a/print,
                   http://cloud-b/print,
                   .....
service-account: user1_cloudA,
                 user1_cloudB,
                 .....
```

FIG. 11

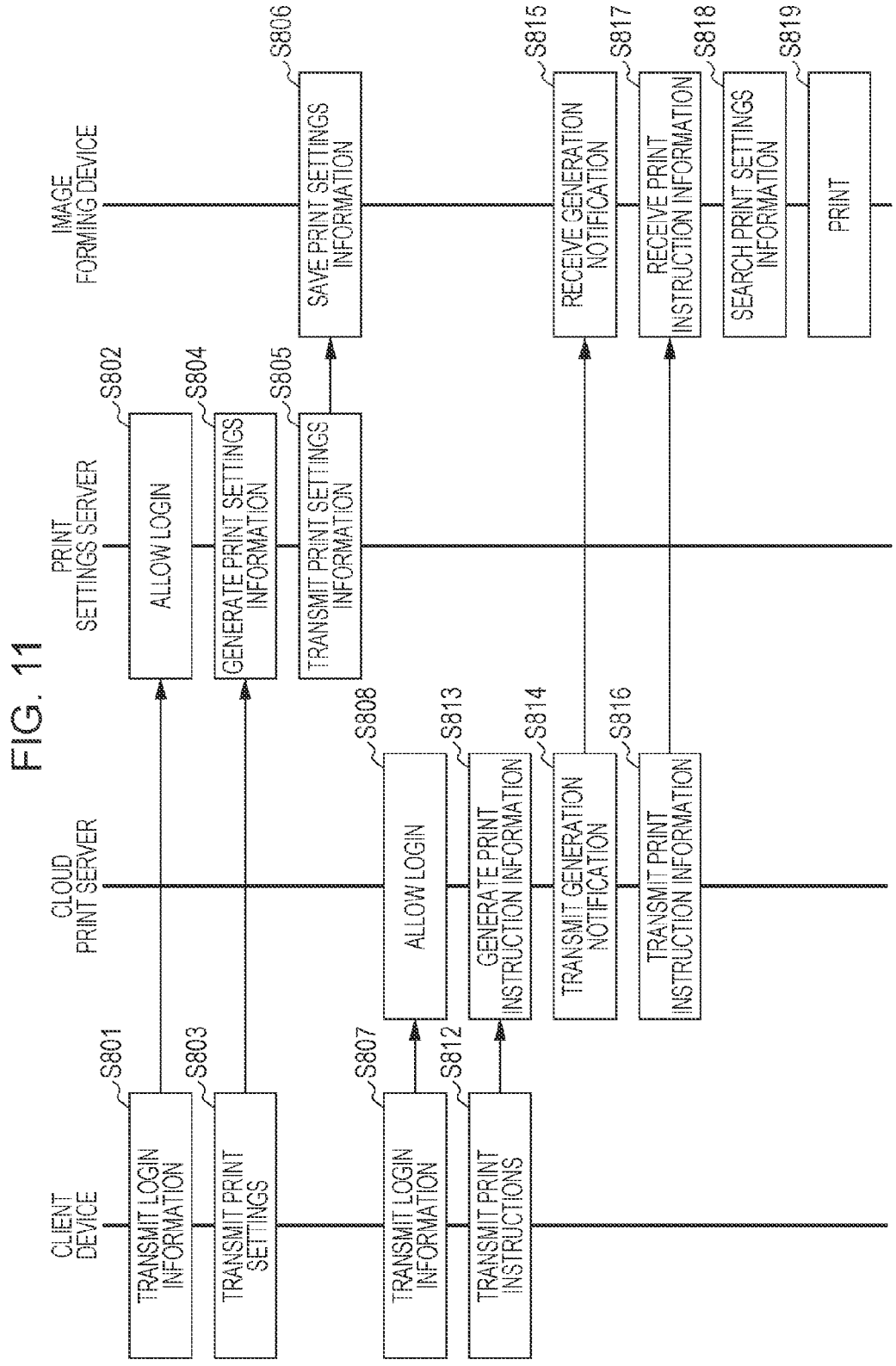

CLIENT DEVICE
CLOUD PRINT SERVER
PRINT SETTINGS SERVER
IMAGE FORMING DEVICE
S801
TRANSMIT LOGIN INFORMATION
S802
ALLOW LOGIN
S803
TRANSMIT PRINT SETTINGS
S804
GENERATE PRINT SETTINGS INFORMATION
S805
TRANSMIT PRINT SETTINGS INFORMATION
S806
SAVE PRINT SETTINGS INFORMATION
S807
TRANSMIT LOGIN INFORMATION
S808
ALLOW LOGIN
S812
TRANSMIT PRINT INSTRUCTIONS
S813
GENERATE PRINT INSTRUCTION INFORMATION
S814
TRANSMIT GENERATION NOTIFICATION
S815
RECEIVE GENERATION NOTIFICATION
S816
TRANSMIT PRINT INSTRUCTION INFORMATION
S817
RECEIVE PRINT INSTRUCTION INFORMATION
S818
SEARCH PRINT SETTINGS INFORMATION
S819
PRINT

FIG. 12

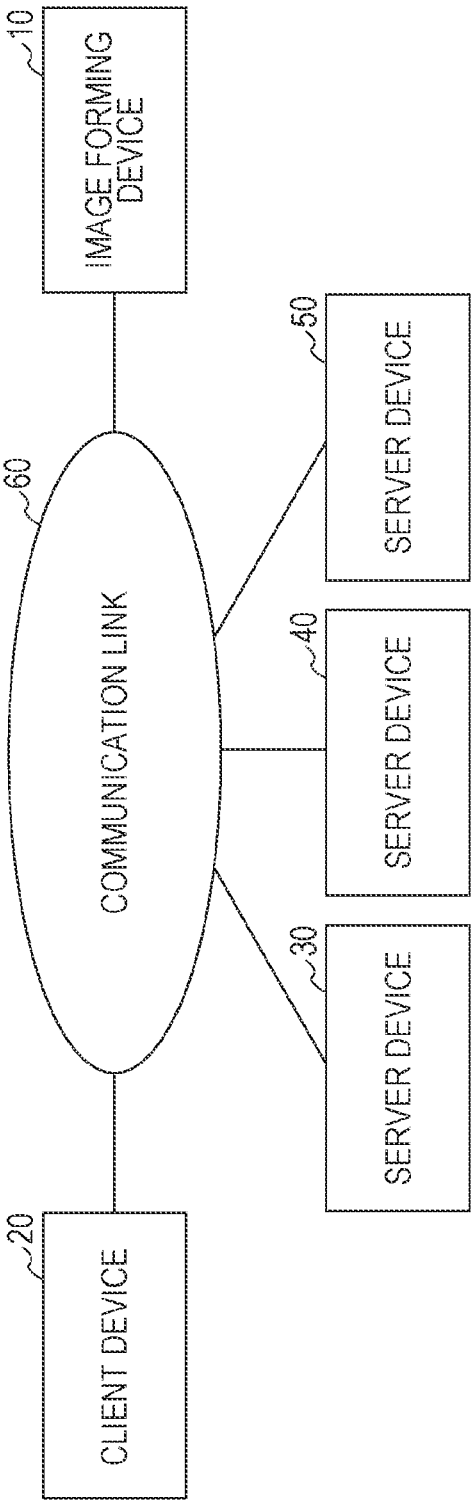

10
IMAGE FORMING DEVICE
50
SERVER DEVICE
60
COMMUNICATION LINK
40
SERVER DEVICE
30
SERVER DEVICE
20
CLIENT DEVICE

FIG. 13

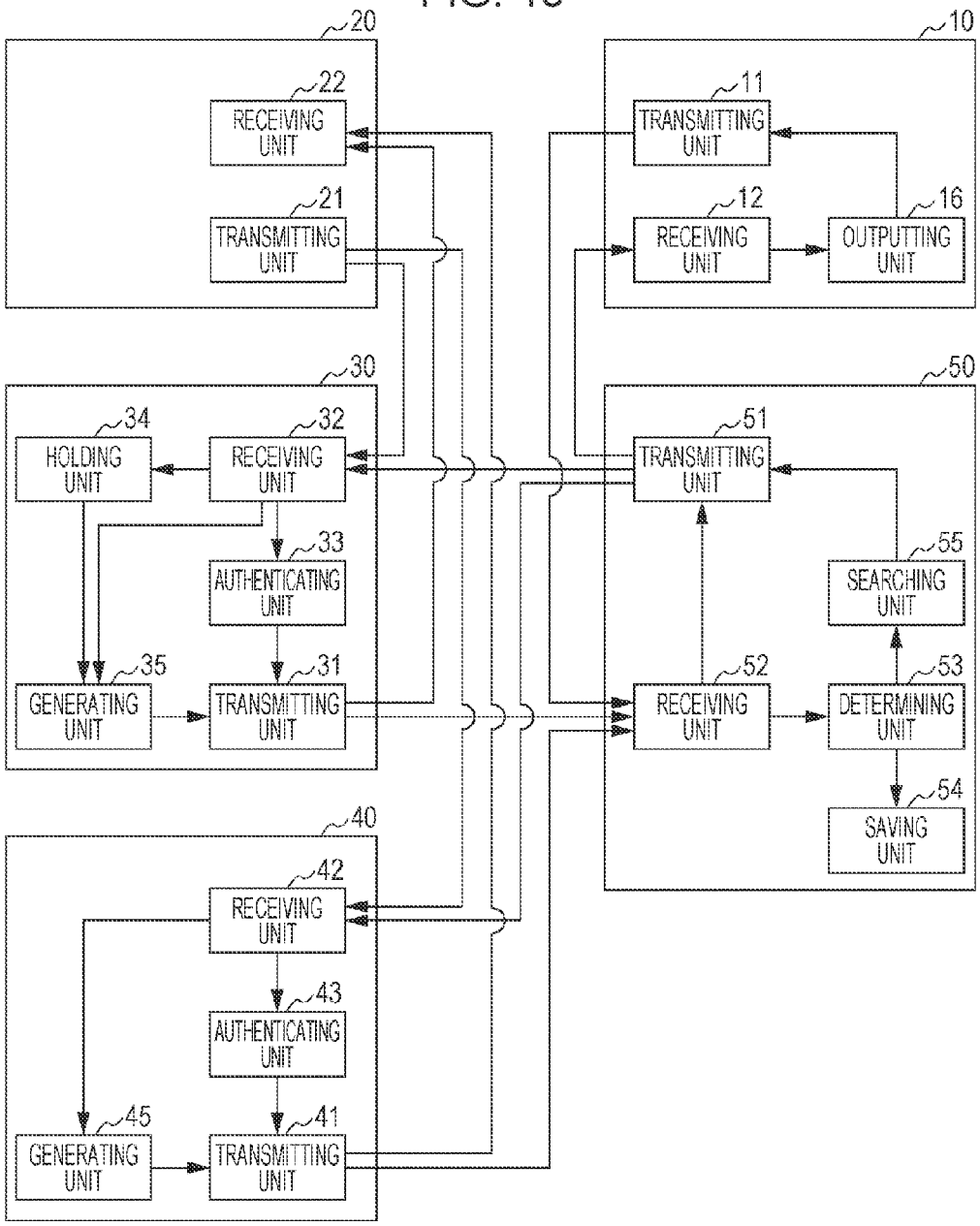

20
22
RECEIVING UNIT
21
TRANSMITTING UNIT
10
11
TRANSMITTING UNIT
12
RECEIVING UNIT
16
OUTPUTTING UNIT
30
34
HOLDING UNIT
32
RECEIVING UNIT
33
AUTHENTICATING UNIT
35
GENERATING UNIT
31
TRANSMITTING UNIT
50
51
TRANSMITTING UNIT
55
SEARCHING UNIT
52
RECEIVING UNIT
53
DETERMINING UNIT
54
SAVING UNIT
40
42
RECEIVING UNIT
43
AUTHENTICATING UNIT
45
GENERATING UNIT
41
TRANSMITTING UNIT

FIG. 14

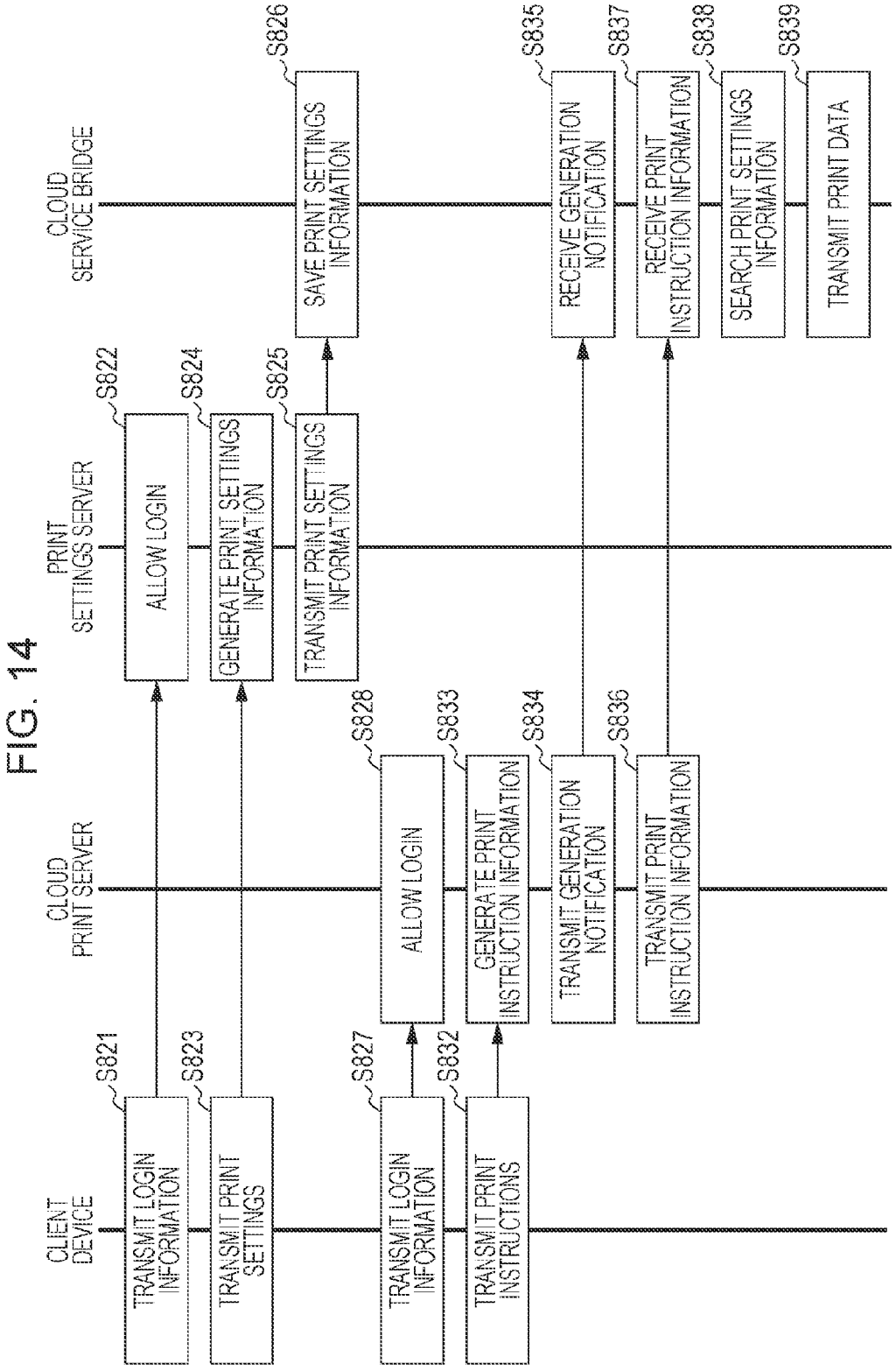

CLIENT DEVICE
CLOUD PRINT SERVER
PRINT SETTINGS SERVER
CLOUD SERVICE BRIDGE
TRANSMIT LOGIN INFORMATION
TRANSMIT PRINT SETTINGS
TRANSMIT LOGIN INFORMATION
TRANSMIT PRINT INSTRUCTIONS
ALLOW LOGIN
GENERATE PRINT SETTINGS INFORMATION
TRANSMIT PRINT SETTINGS INFORMATION
SAVE PRINT SETTINGS INFORMATION
ALLOW LOGIN
GENERATE PRINT INSTRUCTION INFORMATION
TRANSMIT GENERATION NOTIFICATION
TRANSMIT PRINT INSTRUCTION INFORMATION
RECEIVE GENERATION NOTIFICATION
RECEIVE PRINT INSTRUCTION INFORMATION
SEARCH PRINT SETTINGS INFORMATION
TRANSMIT PRINT DATA
S821
S822
S823
S824
S825
S826
S827
S828
S832
S833
S834
S835
S836
S837
S838
S839

FIG. 15

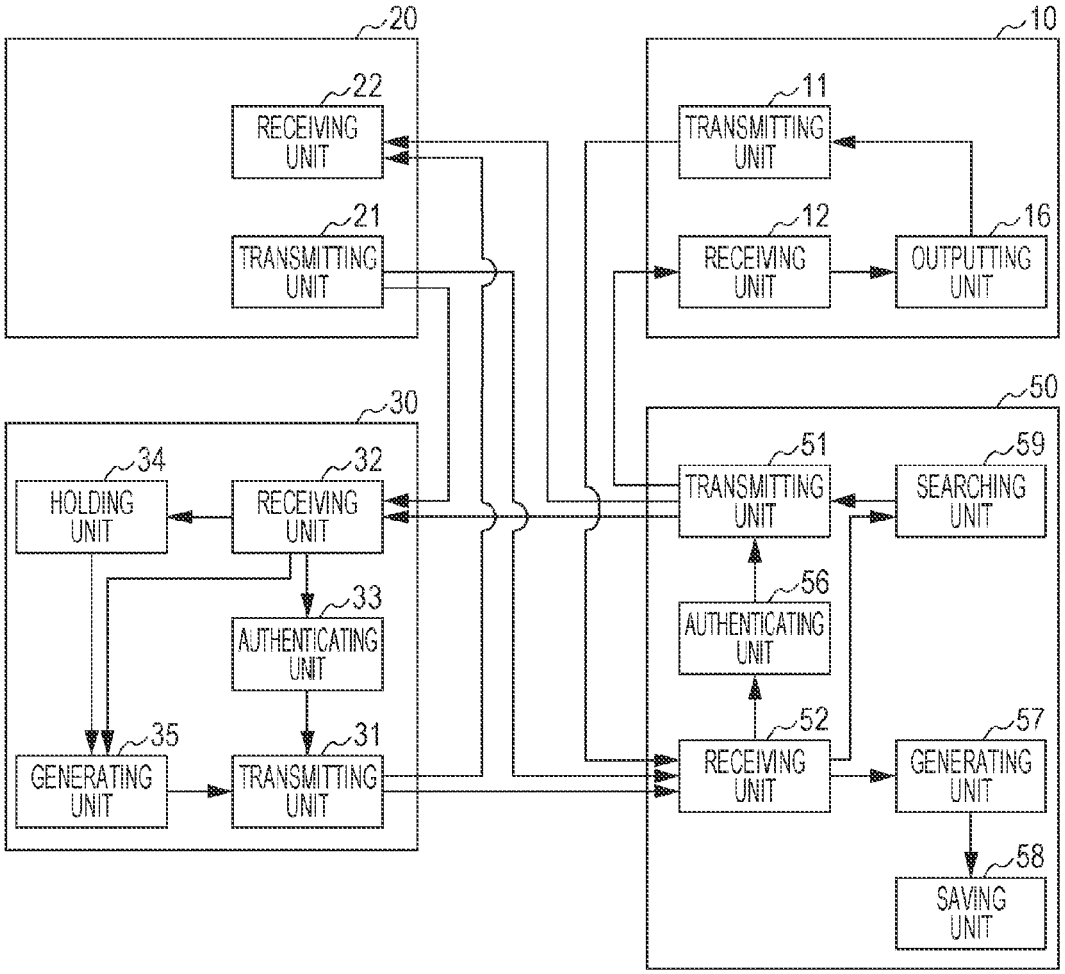
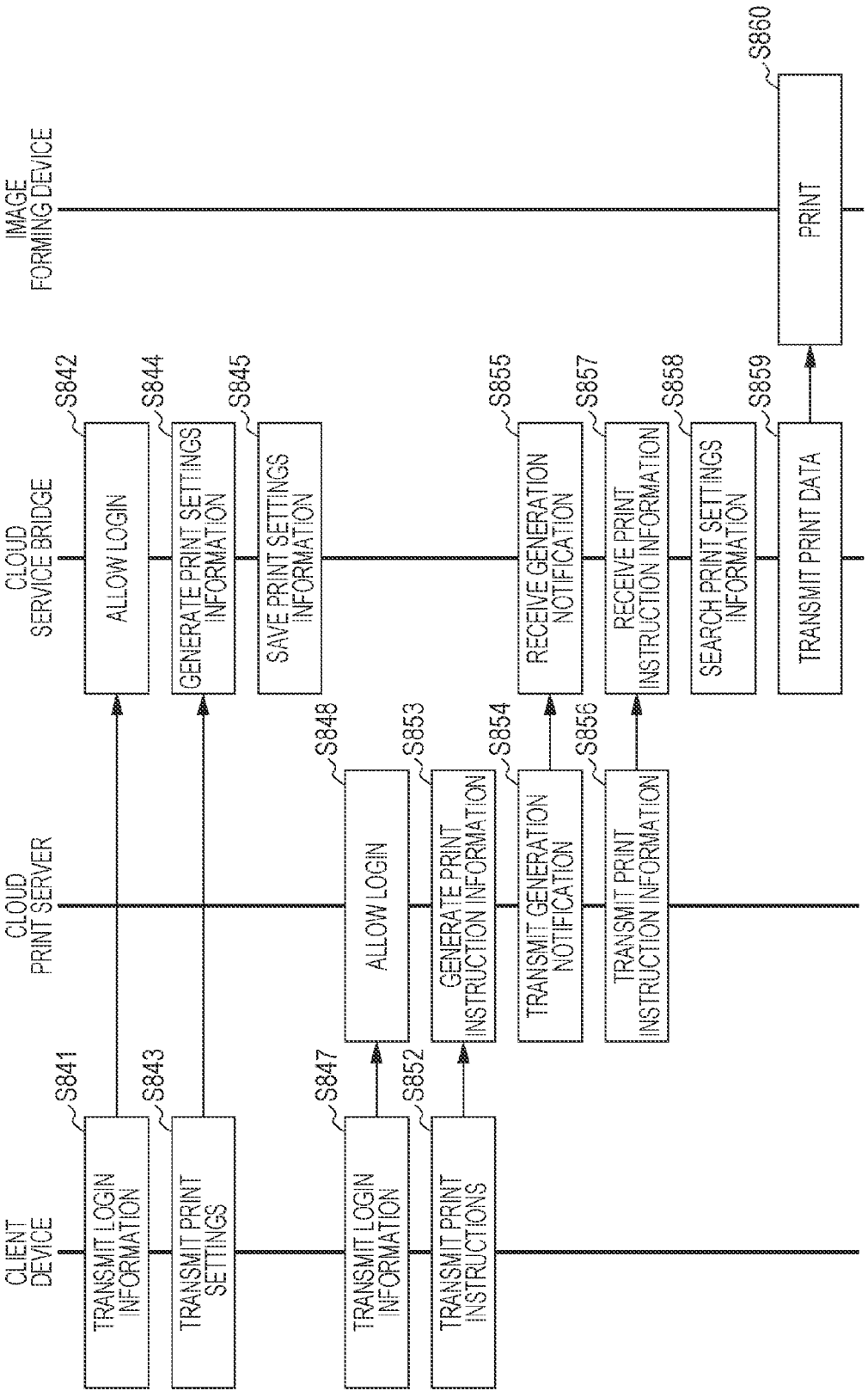

20
22
RECEIVING UNIT
21
TRANSMITTING UNIT
10
11
TRANSMITTING UNIT
12
RECEIVING UNIT
16
OUTPUTTING UNIT
30
34
HOLDING UNIT
32
RECEIVING UNIT
33
AUTHENTICATING UNIT
35
GENERATING UNIT
31
TRANSMITTING UNIT
50
51
TRANSMITTING UNIT
59
SEARCHING UNIT
56
AUTHENTICATING UNIT
52
RECEIVING UNIT
57
GENERATING UNIT
58
SAVING UNIT

FIG. 16


CLIENT DEVICE
CLOUD PRINT SERVER
CLOUD SERVICE BRIDGE
IMAGE FORMING DEVICE
S841
TRANSMIT LOGIN INFORMATION
S842
ALLOW LOGIN
S843
TRANSMIT PRINT SETTINGS
S844
GENERATE PRINT SETTINGS INFORMATION
S845
SAVE PRINT SETTINGS INFORMATION
S847
TRANSMIT LOGIN INFORMATION
S848
ALLOW LOGIN
S852
TRANSMIT PRINT INSTRUCTIONS
S853
GENERATE PRINT INSTRUCTION INFORMATION
S854
TRANSMIT GENERATION NOTIFICATION
S855
RECEIVE GENERATION NOTIFICATION
S856
TRANSMIT PRINT INSTRUCTION INFORMATION
S857
RECEIVE PRINT INSTRUCTION INFORMATION
S858
SEARCH PRINT SETTINGS INFORMATION
S859
TRANSMIT PRINT DATA
S860
PRINT

PRINTER, PRINT CONTROL DEVICE, PRINT SYSTEM, PRINTING METHOD, AND COMPUTER-READABLE MEDIUM FOR PROVIDING SPECIFIC PRINT SETTING INFORMATION

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is based on and claims priority under 35 USC 119 from Japanese Patent Application No. 2013-143090 filed Jul. 8, 2013.

BACKGROUND

Technical Field

The present invention relates to a printer, a print control device, a print system, a printing method, and a computer-readable medium.

SUMMARY

According to an aspect of the invention, there is provided a printer that includes: a first receiver that receives, from any of at least one print instruction information holding device that holds print instruction information giving instructions to print, specific print instruction information associated with a first identifier and instructing the printer to print; a second receiver that receives, from a print settings information holding device that holds print settings information indicating settings for printing, specific print settings information associated with a second identifier and indicating settings for printing by the printer; a specifying unit that, on the basis of the first identifier and the second identifier, specifies the specific print settings information as print settings information corresponding to the specific print instruction information; and a printing unit that uses the specific print settings information to conduct printing based on the specific print instruction information.

BRIEF DESCRIPTION OF THE DRAWINGS

Exemplary embodiments of the present invention will be described in detail based on the following figures, wherein:

FIG. **1** is a diagram exemplifying an overall configuration according to the first to third and fifth exemplary embodiments of the present invention;

FIG. **2** is a block diagram exemplifying a hardware configuration of an image forming device **10** according to an exemplary embodiment of the present invention;

FIG. **3** is a block diagram exemplifying a hardware configuration of a client device or a server device according to an exemplary embodiment of the present invention;

FIG. **4** is a block diagram exemplifying a functional configuration of respective devices according to the first and third exemplary embodiments of the present invention;

FIG. **5** is a diagram exemplifying information held by a print settings server according to the first and second exemplary embodiments of the present invention;

FIG. **6** is a sequence diagram illustrating first exemplary operation according to the first exemplary embodiment of the present invention;

FIG. **7** is a sequence diagram illustrating second exemplary operation according to the first exemplary embodiment of the present invention;

FIG. **8** is a block diagram exemplifying a functional configuration of respective devices according to the second exemplary embodiment of the present invention;

FIG. **9** is a sequence diagram illustrating exemplary operation according to the second exemplary embodiment of the present invention;

FIG. **10** is a diagram exemplifying information held by a print settings server or a cloud service bridge according to the third to fifth exemplary embodiments of the present invention;

FIG. **11** is a sequence diagram illustrating exemplary operation according to the third exemplary embodiment of the present invention;

FIG. **12** is a diagram exemplifying an overall configuration according to the fourth exemplary embodiment of the present invention;

FIG. **13** is a block diagram exemplifying a functional configuration of respective devices according to the fourth exemplary embodiment of the present invention;

FIG. **14** is a sequence diagram illustrating exemplary operation according to the fourth exemplary embodiment of the present invention;

FIG. **15** is a block diagram exemplifying a functional configuration of respective devices according to the fifth exemplary embodiment of the present invention; and

FIG. **16** is a sequence diagram illustrating exemplary operation according to the fifth exemplary embodiment of the present invention.

DETAILED DESCRIPTION

Hereinafter, exemplary embodiments of the invention will be described in detail and with reference to the attached drawings.

[First Exemplary Embodiment]

FIG. **1** is a diagram exemplifying an overall configuration according to the first exemplary embodiment of the present invention. An image forming device **10** is equipped with a document copying function, a function of scanning a document and generating scanned document image data, and a function of forming an image expressed by image data onto a sheet. A client device **20** receives information input by a user, and outputs information to the user. Server devices **30** and **40** receive a request from the client device **20** and provide a service. The respective devices are connected to a communication link **60** that communicably connects devices to each other, and are capable of communicating with each other via the communication link **60**. Note that although FIG. **1** illustrates one image forming device, one client device, and two server devices, two or more image forming devices or client devices, and three or more server devices may also be connected to the communication link **60**.

FIG. **2** is a block diagram exemplifying a hardware configuration of an image forming device **10** according to an exemplary embodiment. As illustrated in FIG. **2**, the respective components of the image forming device **10** are connected to a bus **101**, and exchange various data via this bus **101**.

The operating unit **106** is equipped with multiple operable elements that receive user operations. The operable elements may be hardware keys. Additionally, an operable element may be configured as a touch panel that outputs a control signal according to a pressed position displayed on a display unit **107**.

The display unit **107** is a display device that includes a liquid crystal display, for example. Under control by a CPU **102**, the display unit **107** displays data a menu screen for

operating the image forming device **10** or data related to the image forming device **10**, for example.

An image scanning unit **108** is equipped with an image scanning device that scans a document to generate image data expressing an image of the scanned document, and outputs generated image data to an image processing unit **111**.

An image forming unit **109** is equipped with an image forming mechanism that forms a toner image in accordance with image data on a recording medium, such as paper, for example, via an electrophotographic system.

A communication unit **110** is connected to the communication link **60**, and functions as a communication interface that communicates with other devices connected to the communication link **60**.

The image processing unit **111** applies image processing such as color correction and tone correction to an image expressed by input image data, and generates and outputs processed image data to the image forming unit **109**.

A storage unit **105** is equipped with a storage device, and stores data received by the communication unit **110** or data generated by the image forming device **10**, for example.

Read-only memory (ROM) **103** stores a control program executed by the central processing unit (CPU) **102**. The CPU **102** retrieves a control program stored in the ROM **103**, and executes the control program by using random access memory (RAM) **104** as a work area. When the control program is executed by the CPU **102**, the respective components of the image forming device **10** are controlled by the CPU **102**, enabling the image forming device **10** to form and output an image on a sheet, scan a document and generate document image data, and communicate with another device via the communication link **60**, for example.

Note that a program executed by the CPU **102** may be provided in a recorded state on a computer-readable recording medium, such as a magnetic recording medium (such as magnetic tape or a magnetic disk), an optical recording medium (such as an optical disc), a magneto-optical recording medium, or semiconductor memory. In addition, such a program may also be downloaded to the image forming device **10** by using a communication medium such as the Internet.

FIG. **3** is a block diagram exemplifying a hardware configuration of a client device **20** according to an exemplary embodiment.

As illustrated in FIG. **3**, the client device **20** is equipped with a CPU **201** as a computational component, as well as main memory **202** and a hard disk drive (HDD) **203** as storage components. Herein, the CPU **201** executes various software such as an operating system (OS) and applications, and realizes the respective functions to be discussed later. Also, the main memory **202** is a storage area that stores information such as various software and data used in the execution thereof, while the HDD **203** is a storage area that stores information such as input data that is input into various software and output data that is output from various software.

Furthermore, the client device **20** is equipped with a communication interface (hereinafter designated "communication I/F") **204** for communicating externally, a display mechanism **205** made up of video memory and a display or the like, and an input device **206** such as a keyboard and mouse.

FIG. **3** may also be interpreted as a block diagram exemplifying a hardware configuration of the server device **30**. In this case, the CPU **201**, the main memory **202**, the HDD **203**, the communication I/F **204**, the display mechanism **205**, and the input device **206** will be respectively designated the CPU **301**, the main memory **302**, the HDD **303**, the communication I/F **304**, the display mechanism **305**, and the input device **306**.

Additionally, FIG. **3** may also be interpreted as a block diagram exemplifying a hardware configuration of the server device **40**. In this case, the CPU **201**, the main memory **202**, the HDD **203**, the communication I/F **204**, the display mechanism **205**, and the input device **206** will be respectively designated the CPU **401**, the main memory **402**, the HDD **403**, the communication I/F **404**, the display mechanism **405**, and the input device **406**.

Note that a program executed by the CPU **201**, **304**, or **401** may be provided in a recorded state on a computer-readable recording medium, such as a magnetic recording medium (such as magnetic tape or a magnetic disk), an optical recording medium (such as an optical disc), a magneto-optical recording medium, or semiconductor memory. In addition, such a program may also be downloaded to the client device **20** or the server device **30** or **40** by using a communication medium such as the Internet.

Meanwhile, in the present exemplary embodiment, a cloud print server **30** is used as the server device **30** in FIG. **1**. The cloud print server **30** provides a cloud service enabling a document to be printed by an image forming device **10** installed in a home, office, public place, or the like by using various devices as the client device **20** (hereinafter designated the "cloud print service"). Specifically, print instruction information giving instructions to print a document on an image forming device **10** is generated upon request from the client device **20** and accumulated until there is a query for the existence of print instruction information from that image forming device **10**. When there is a query, a document image is generated in a format that is commonly processable by all image forming devices **10** is provided to that image forming device **10**. Note that the provision of such a document image to the image forming device **10** is conducted by transmitting print instruction information including the document image to the image forming device **10**. Hereinafter, referring to "print instruction information" means that the document image to be printed is also included.

Also, in the present exemplary embodiment, a print settings server **40** is used as the server device **40** in FIG. **1**. The print settings server **40** provides a separate cloud service enabling print settings to be configured for printing using the cloud print service (hereinafter designated the "print settings service"). Whereas a cloud print service has the advantage of enabling printing without using a proprietary printer driver by the manufacturer of the image forming device **10**, the manufacturer's proprietary functions that have been provided with printer drivers of the past may be unavailable. Accordingly, additional print settings that are unavailable on the cloud print service may be configured in the print settings service. Alternatively, print settings configured with the print settings service may be used instead of print settings configured with the cloud print service. Specifically, print settings information indicating additional or substitute print settings for printing a document on the image forming device **10** is generated upon request from the client device **20**, and provided to that image forming device **10**. Note that the client settings service may be specialized for individual models of the image forming device **10**.

In addition, the image forming device **10** is configured to be able to connect to a communication link **60** such as the Internet. Services able to connect with the image forming device **10** include the cloud print service and the print

settings service, and the image forming device **10** communicates with these services via a proxy server not illustrated in the drawings. Also, assume that the image forming device **10** is set to a state enabling print instruction information to be received from the cloud print service. Specifically, the image forming device **10** is registered with the cloud print service, and information related to the cloud print service is configured in the image forming device **10**.

FIG. **4** is a block diagram exemplifying a functional configuration of the image forming device **10**, the client device **20**, the cloud print server **30**, and the print settings server **40** according to the present exemplary embodiment.

As illustrated in FIG. **4**, the image forming device **10** is equipped with a transmitting unit **11**, a receiving unit **12**, a determining unit **13**, a saving unit **14**, a searching unit **15**, and an outputting unit **16**. The transmitting unit **11** transmits polling data querying the existence of print instruction information to the cloud print server **30**. The receiving unit **12** receives a generation notification reporting that print instruction information has been generated as well as print instruction information, including a user ID, from the cloud print server **30**, and receives print settings information, including a user ID, from the print settings server **40**. The determining unit **13** determines the type of data received by the receiving unit **12**. In the case in which the determining unit **13** determines that the data is print settings information, the saving unit **14** saves the print settings information in the storage unit **105** (see FIG. **2**). In the case in which the determining unit **13** determines that the data is print instruction information, the searching unit **15** searches the storage unit **105** for print settings information that includes the same user ID as the user ID included in the print instruction information. Also, in the case in which such print settings information is not in the storage unit **105**, the searching unit **15** waits for subsequently received print settings information, and determines whether or not that print settings information includes the same user ID as the user ID included in the print instruction information. The outputting unit **16** outputs print data, including the print instruction information received by the receiving unit **12** and the print settings information found by the searching unit **15**, to the image forming unit **109** (see FIG. **2**) via the image processing unit **111** (see FIG. **2**). In the present exemplary embodiment, the image forming device **10** is provided as an example of a printer. Also, the receiving unit **12** is provided as an example of a first receiver and a second receiver, the searching unit **15** is provided as an example of a specifying unit, and the image forming unit **109** is provided as an example of a printing unit.

The client device **20** is equipped with a transmitting unit **21** and a receiving unit **22**. The transmitting unit **21** transmits information such as a user ID relevant to logging in to the cloud print service and the print settings service (hereinafter designated "login information"), and in additionally, transmits print settings for printing by the cloud print service to the cloud print server **30** and the print settings server **40**, and transmits print instructions giving instructions to print using the cloud print service to the cloud print server **30**. The receiving unit **22** receives responses to the information transmitted by the transmitting unit **21** from the cloud print server **30** and the print settings server **40**. In the present exemplary embodiment, the client device **20** is provided as an example of a print instructing device.

The cloud print server **30** is equipped with a transmitting unit **31**, a receiving unit **32**, an authenticating unit **33**, a holding unit **34**, and a generating unit **35**. The transmitting unit **31** transmits a generation notification reporting that print instruction information has been generated as well as print instruction information, including a user ID, to the image forming device **10**. The receiving unit **32** receives login information relevant to logging into the cloud print service, print settings available on the cloud print service for printing by the cloud print service, and print instructions giving instructions to print using the cloud print service from the client device **20**, and receives polling data querying the existence of print instruction information from the image forming device **10**. The authenticating unit **33** conducts authentication on the basis of login information received by the receiving unit **32**. The holding unit **34** holds print settings received by the receiving unit **32**. The generating unit **35** generates and holds print instruction information on the basis of print instructions received by the receiving unit **32**. In the present exemplary embodiment, the cloud print server **30** is provided as an example of a print instruction information holding device. Also, the receiving unit **32** is provided as an example of a receiver, and the generating unit **35** is provided as an example of a holding unit.

The print settings server **40** is equipped with a transmitting unit **41**, a receiving unit **42**, an authenticating unit **43**, and a generating unit **45**. The transmitting unit **41** transmits print settings information, including a user ID, to the image forming device **10**. The receiving unit **42** receives login information relevant to logging into the print settings service and print settings unavailable on the cloud print service for printing by the cloud print service from the client device **20**. The authenticating unit **43** conducts authentication on the basis of login information received by the receiving unit **42**. The generating unit **45** generates and holds print settings information on the basis of print settings received by the receiving unit **42**. In the present exemplary embodiment, the print settings server **40** is provided as an example of a print settings information holding device.

FIG. **5** is a diagram exemplifying information held by the print settings server **40**. Among the information held by the print settings server **40**, first, there is print settings information generated by the generating unit **45**. In FIG. **5**, the value "staple-top-left" is specified for the parameter "finishings", and the value "reverse-portrait" is specified for the parameter "orientation-requested", as the print settings information. The former indicates stapling at the top-left as a finishing process, while the latter indicates that the print orientation is set to portrait in a reverse orientation. Also, among the information held by the print settings server **40**, there is information to be included in the print settings information and transmitted to the image forming device **10**. In FIG. **5**, the value "user1_cloudA" is specified for the parameter "service-account" as such information. This indicates that the user ID for logging into the cloud print service is "user1_cloudA". Note that herein, although the print settings information for one cloud print service is defined as one set of print settings information, as illustrated later in FIG. **10**, print settings information for multiple cloud print services may also be defined as one set of print settings information. In addition, the print settings information may be used in common for all cloud print services, or used with one or multiple cloud print services from among multiple registered cloud print services. In this case, combinations of a relevant service ID and a user ID are included in the respective print settings information.

FIG. **6** is a sequence diagram illustrating first exemplary operation according to the first exemplary embodiment.

First, a client device **20** such as mobile equipment, following instructions from a user, accesses a cloud print service and logs into the cloud print service with a prereg-

istered user ID. Specifically, on the client device **20**, the transmitting unit **21** transmits login information such as a user ID to the cloud print server **30** (step S**701**). Subsequently, on the cloud print server **30**, the receiving unit **32** receives the login information, the authenticating unit **33** conducts authentication on the basis thereof, and allows login if authentication succeeds (step S**702**). Note that, although not illustrated in the drawings, information about whether or not login is allowed is passed from the authenticating unit **33** to the transmitting unit **31**, and sent in reply from the transmitting unit **31** to the client device **20**.

After that, the client device **20** configures print settings available on the cloud print service for an arbitrary document stored in the cloud print service. Specifically, on the client device **20**, the transmitting unit **21** transmits print settings to the cloud print server **30** (step S**703**). Subsequently, on the cloud print server **30**, the receiving unit **32** receives the print settings, and the holding unit **34** holds the print settings (step S**704**).

Meanwhile, in parallel to the above, the client device **20** also logs into the print settings service with the user ID. Specifically, on the client device **20**, the transmitting unit **21** transmits login information such as a user ID to the print settings server **40** (step S**705**). Subsequently, on the print settings server **40**, the receiving unit **42** receives the login information, the authenticating unit **43** conducts authentication on the basis thereof, and allows login if authentication succeeds (step S**706**). Note that, although not illustrated in the drawings, information about whether or not login is allowed is passed from the authenticating unit **43** to the transmitting unit **41**, and sent in reply from the transmitting unit **41** to the client device **20**.

After that, the client device **20** displays a print settings screen of the print settings service, and additionally configures print settings that are unavailable on the cloud print service for the above document stored in the cloud print service. In addition, the image forming device **10** to conduct the printing is also specified. Specifically, on the client device **20**, the transmitting unit **21** transmits additional print settings, including information indicating the image forming device **10** to conduct the printing, to the print settings server **40** (step S**707**).

Next, the print settings server **40** generates print settings information indicating the additional print settings, and transmits the print settings information, including the user ID of the user using the client device **20**, to the specified image forming device **10**. Specifically, on the print settings server **40**, the generating unit **45** generates print settings information (step S**708**), and the transmitting unit **41** transmits the print settings information, including the user ID, to the specified image forming device **10** (step S**709**). Note that although the print settings information may be transmitting using any protocol, herein it is assumed that the print settings information is transmitting using the print protocol used to transmit the print instruction information.

As a result, the image forming device **10** receives data, and upon determining that the data is print settings information, saves the print settings information in a storage unit **105** such as an internal HDD (see FIG. **2**). Specifically, on the image forming device **10**, the receiving unit **12** receives data, the determining unit **13** determines whether or not the data is print settings information, and if the data is determined to be print settings information, the saving unit **14** saves the print settings information in the storage unit **105** (step S**710**).

After that, the client device **20** gives instructions to print the above document stored in the cloud print service on the same image forming device **10**. Specifically, on the client device **20**, the transmitting unit **21** transmits print instructions to print a document on the image forming device **10** specified in step S**707** to the cloud print server **30** (step S**712**). Subsequently, on the cloud print server **30**, the receiving unit **32** receives the print instructions, and the generating unit **35** generates print instruction information on the basis of the print instructions (step S**713**). Note that this print instruction information also includes the print settings being held by the holding unit **34**.

As a result, the cloud print server **30** notifies the image forming device **10** that print instruction information has been generated, and the image forming device **10** receives this notification and acquires print instruction information from the cloud print server **30**. Specifically, on the cloud print server **30**, the transmitting unit **31** transmits a generation notification reporting that print instruction information has been generated to the image forming device **10** (step S**714**). Subsequently, on the image forming device **10**, the receiving unit **12** receives the generation notification (step S**715**), and although not illustrated in the drawings, the transmitting unit **11** polls the cloud print server **30**. As a result, on the cloud print server **30**, the transmitting unit **31** transmits print instruction information, including a user ID, to the image forming device **10** (step S**716**). Subsequently, on the image forming device **10**, the receiving unit **12** receives the print instruction information (step S**717**). Note that in this case, since the determining unit **13** determines that the received data is print instruction information, the print instruction information is passed to the searching unit **15**.

Next, the image forming device **10** extracts the user ID from the acquired print instruction information, and searches the storage unit **105** for print settings information having the same user ID. Specifically, the searching unit **15** searches user IDs included in print settings information stored in the storage unit **105** for the user ID included in the print instruction information passed from the determining unit **13** (step S**718**).

As a result, if print settings information having the user ID extracted from the print instruction information is found, the image forming device **10** conducts various printing using the print settings indicated by the print settings information. Specifically, the outputting unit **16** outputs print data, including the print instruction information received in step S**717** and the print settings information found in step S**718**, to the image forming unit **109** (see FIG. **2**) via the image processing unit **111** (see FIG. **2**) (step S**719**). Consequently, in the image forming unit **109**, a document image included in the print instruction information is printed using the print settings information.

Note that in the first exemplary operation, used print settings information may be deleted, or saved until user instructions are given.

FIG. **7** is a sequence diagram illustrating second exemplary operation according to the first exemplary embodiment.

In the first exemplary operation, the image forming device **10**, after acquiring print instruction information, searches the storage unit **105** (see FIG. **2**) for print settings information having the same user ID, but in some cases such print settings information may not be discovered. Conceivable examples of such cases are the case in which the user has not configured additional print settings, and the case in which print settings information indicating additional print settings configured by the user does not reach the image forming device **10** for some reason. Specifically, the former is the

case of executing steps S721 to S726 corresponding to steps S701 to S706 in FIG. 6, not executing the steps corresponding to steps S707 to S710 that are subsequently executed in FIG. 6, and then executing steps S732 to S738 corresponding to steps S712 to S718 in FIG. 6.

Accordingly, in the case in which print settings information having the same user ID is not discovered when the image forming device 10 acquires print instruction information, the image forming device 10 temporarily defers printing based on the acquired print instruction information, and later receives subsequent data. Specifically, the image forming device 10 waits for the transmitting unit 21 on the client device 20 to transmit print settings to the print settings server 40 (step S739), the receiving unit 42 on the print settings server 40 to receive the print settings, the generating unit 45 to generate print settings information on the basis of the print settings (step S740), and the transmitting unit 41 to transmit the print settings information (step S741).

Then, in the case in which the subsequently received data is print settings information and also includes the same user ID as the user ID included in the deferred print instruction information, printing based on the deferred print instruction information is conducted using the print settings information received at this point. Specifically, if the receiving unit 12 receives print settings information, the saving unit 14 stores the print settings information in the storage unit 105 (see FIG. 2), and the searching unit 15 searches the user ID included in the print settings information newly stored in the storage unit 105 for the user ID included in the print instruction information passed from the determining unit 13. In other words, a determination is made regarding whether or not the user ID included in the print instruction information passed from the determining unit 13 is the same as the user ID included in the print settings information newly stored in the storage unit 105 (step S742). As a result, if these user IDs are determined to be the same, the outputting unit 16 outputs print data, including the print instruction information received in step S737 and the print settings information found in step S742, to the image forming unit 109 (see FIG. 2) via the image processing unit 111 (see FIG. 2) (step S743). Consequently, in the image forming unit 109, a document image included in the print instruction information is printed using the print settings information.

Note that in the second exemplary operation, deferred print instruction information may also be printed without using print settings information or deleted, such as after a predetermined time period elapses, or after receiving a predetermined number of sets of print instruction information.

Also, in the first exemplary embodiment, the print settings that the client device 20 transmits to the print settings server 40 are taken to be additional print settings with respect to the print settings that the client device 20 transmits to the cloud print server 30, but may also be taken to be substitute print settings with respect to the print settings that the client device 20 transmits to the cloud print server 30.

[Second Exemplary Embodiment]

Since an overall configuration according to the second exemplary embodiment of the present invention is the same as that exemplified in FIG. 1, description thereof will be reduced or omitted. Also, since the hardware configuration of an image forming device 10 according to the present exemplary embodiment is likewise the same as that exemplified in FIG. 2, description thereof will be reduced or omitted. Furthermore, the hardware configuration of a client device 20 and server devices 30 and 40 according to the present exemplary embodiment is likewise the same as that exemplified in FIG. 3, or deducible from that exemplified in FIG. 3, description thereof will be reduced or omitted.

Meanwhile, in the present exemplary embodiment, the cloud print server 30 is still used as the server device 30 in FIG. 1, and the print settings server 40 is still used as the server device 40 in FIG. 1. Since the cloud print server 30 and the print settings server 40 have been discussed in the first exemplary embodiment, description herein will be reduced or omitted.

FIG. 8 is a block diagram exemplifying a functional configuration of the image forming device 10, the client device 20, the cloud print server 30, and the print settings server 40 according to the present exemplary embodiment.

As illustrated in FIG. 8, the image forming device 10 is equipped with a transmitting unit 11, a receiving unit 12, a determining unit 13, a saving unit 14, a searching unit 15, and an outputting unit 16. The transmitting unit 11 transmits polling data querying the existence of print instruction information to the cloud print server 30. The receiving unit 12 receives a generation notification reporting that print instruction information has been generated as well as print instruction information, including a user ID, from the cloud print server 30, and receives print settings information, including a user ID, from the print settings server 40. The determining unit 13 determines the type of data received by the receiving unit 12. In the case in which the determining unit 13 determines that the data is print settings information, the saving unit 14 saves the print settings information in the storage unit 105 (see FIG. 2). In the case in which the determining unit 13 determines that the data is print instruction information, the searching unit 15 searches the storage unit 105 for print settings information that includes the same user ID as the user ID included in the print instruction information. The outputting unit 16 outputs print data, including the print instruction information received by the receiving unit 12 and the print settings information found by the searching unit 15, to the image forming unit 109 (see FIG. 2) via the image processing unit 111 (see FIG. 2). In the present exemplary embodiment, the image forming device 10 is provided as an example of a printer. Also, the receiving unit 12 is provided as an example of a first receiver and a second receiver, the searching unit 15 is provided as an example of a specifying unit, and the image forming unit 109 is provided as an example of a printing unit.

The client device 20 is equipped with a transmitting unit 21 and a receiving unit 22. The transmitting unit 21 transmits login information relevant to logging into the print settings service, information specifying a cloud print service to use for printing (hereinafter designated "specifying information"), print settings for printing by the cloud print service, and print instructions giving instructions to print using the cloud print service to the print settings server 40. The receiving unit 22 receives responses to the information transmitted by the transmitting unit 21 from the print settings server 40. In the present exemplary embodiment, the client device 20 is provided as an example of a print instructing device.

The cloud print server 30 is equipped with a transmitting unit 31, a receiving unit 32, an authenticating unit 33, and a generating unit 35. The transmitting unit 31 transmits a generation notification reporting that print instruction information has been generated as well as print instruction information, including a user ID, to the image forming device 10. The receiving unit 32 receives login information relevant to logging into the cloud print service and print instructions giving instructions to print using the cloud print service from the print settings server 40, and receives polling

data querying the existence of print instruction information from the image forming device **10**. The authenticating unit **33** conducts authentication on the basis of the login information received by the receiving unit **32**. The generating unit **35** generates and holds print instruction information on the basis of print instructions received by the receiving unit **32**. In the present exemplary embodiment, the cloud print server **30** is provided as an example of a print instruction information holding device. Also, the receiving unit **32** is provided as an example of a receiver, and the generating unit **35** is provided as an example of a holding unit.

The print settings server **40** is equipped with a transmitting unit **41**, a receiving unit **42**, an authenticating unit **43**, a holding unit **44**, and a generating unit **45**. The transmitting unit **41** transmits login information relevant to logging into the cloud print service and print instructions giving instructions to print using the cloud print service to the cloud print server **30**, and transmits print settings information, including a user ID, to the image forming device **10**. The receiving unit **42** receives login information relevant to logging into the print settings service, specifying information that specifies a cloud print service to use for printing, print settings for printing by the cloud print service, and print instructions giving instructions to print using the cloud print service from the client device **20**. The authenticating unit **43** conducts authentication on the basis of login information received by the receiving unit **42**. The holding unit **44** holds specifying information received by the receiving unit **42**. The generating unit **45** generates and holds print settings information on the basis of print settings received by the receiving unit **42**. In the present exemplary embodiment, the print settings server **40** is provided as an example of a print settings information holding device. Also, the receiving unit **42** is provided as an example of a receiver, and the transmitting unit **41** is provided as an example of a transmitter.

Note that since the information held by the print settings server **40** is the same as that exemplified in FIG. **5**, description herein will be reduced or omitted.

FIG. **9** is a sequence diagram illustrating exemplary operation according to the second exemplary embodiment.

First, a client device **20** such as mobile equipment, following instructions from a user, accesses a print settings service and logs into the print settings service with a preregistered user ID. Specifically, on the client device **20**, the transmitting unit **21** transmits login information such as a user ID to the print settings server **40** (step S**761**). Subsequently, on the print settings server **40**, the receiving unit **42** receives the login information, the authenticating unit **43** conducts authentication on the basis thereof, and allows login if authentication succeeds (step S**762**). Note that, although not illustrated in the drawings, information about whether or not login is allowed is passed from the authenticating unit **43** to the transmitting unit **41**, and sent in reply from the transmitting unit **41** to the client device **20**.

After that, the client device **20** specifies a cloud print service to use for printing by Uniform Resource Locator (URL) or the like. Specifically, on the client device **20**, the transmitting unit **21** transmits specifying information such as a URL to the print settings server **40** (step S**763**). Subsequently, on the print settings server **40**, the receiving unit **42** receives the specifying information, and the holding unit **44** holds the specifying information (step S**764**).

In addition, the print settings server **40** logs into the cloud print service on behalf of the client device **20**. Specifically, on the print settings server **40**, the transmitting unit **41** transmits login information such as a user ID to the cloud print server **30** specified by the specifying information held by the holding unit **44** (step S**765**). Subsequently, on the cloud print server **30**, the receiving unit **32** receives the login information, the authenticating unit **33** conducts authentication on the basis thereof, and allows login if authentication succeeds (step S**766**). Note that, although not illustrated in the drawings, information about whether or not login is allowed is passed from the authenticating unit **33** to the transmitting unit **31**, and sent in reply from the transmitting unit **31** to the print settings server **40**. Also, at this point, the print settings server **40** acquires from the cloud print server **30** a document list, which is a list of documents that a user may print. Subsequently, the acquired document list is included in a UI screen provided by the print settings service (a webpage, for example), and displayed on the client device **20**.

Consequently, the client device **20** selects a user-specified document from the displayed document list, displays a print settings screen and configures print settings, and the print settings server **40** generates print settings information indicating the print settings. Specifically, on the client device **20**, the transmitting unit **21** transmits print settings to the print settings server **40** (step S**767**). Subsequently, on the print settings server **40**, the receiving unit **42** receives the print settings, and the generating unit **45** generates print settings information (step S**768**).

After that, the client device **20** gives instructions to print the user-specified document on the image forming device **10**. Subsequently, the print settings server **40** transmits the print settings information, including the user ID of the user using the client device **20**, to the image forming device **10**. Specifically, on the client device **20**, the transmitting unit **21** transmits print instructions to print a document on the image forming device **10** to the print settings server **40** (step S**769**). Subsequently, on the print settings server **40**, the receiving unit **42** receives the print instructions, and the transmitting unit **41** transmits the print settings information generated in step S**768** to the image forming device **10** (step S**770**).

Next, the print settings server **40** transmits print instructions to print the user-specified document to the cloud print service. Specifically, on the print settings server **40**, the transmitting unit **41** transmits print instructions to print a document on the image forming device **10** to the cloud print server **30** (step S**772**). Note that since the process from steps S**773** to S**779** after the cloud print server **30** receives the print instructions is the same as the process from steps S**713** to S**719** of FIG. **6**, description thereof will be reduced or omitted.

[Third Exemplary Embodiment]

Since an overall configuration according to the third exemplary embodiment of the present invention is the same as that exemplified in FIG. **1**, description thereof will be reduced or omitted. Also, since the hardware configuration of an image forming device **10** according to the present exemplary embodiment is likewise the same as that exemplified in FIG. **2**, description thereof will be reduced or omitted. Furthermore, the hardware configuration of a client device **20** and server devices **30** and **40** according to the present exemplary embodiment is likewise the same as that exemplified in FIG. **3**, or deducible from that exemplified in FIG. **3**, description thereof will be reduced or omitted.

Meanwhile, in the present exemplary embodiment, the cloud print server **30** is still used as the server device **30** in FIG. **1**, and the print settings server **40** is still used as the server device **40** in FIG. **1**. The cloud print server **30** and the print settings server **40** are the same as those discussed in the first exemplary embodiment, except for the following points. Namely, in the present exemplary embodiment, a user has a

user ID for logging into each of multiple cloud print services, and is able to manage and print documents on the image forming device **10** using each of the multiple cloud print services. In addition, the user is assumed to also have a user ID for logging into a print settings service. Furthermore, assume that the user has registered an ID of a cloud print service that the user is able to use (hereinafter designated a "service ID") in association with a user ID for logging into that cloud print service.

Since a functional configuration of the image forming device **10**, the client device **20**, the cloud print server **30**, and the print settings server **40** according to the present exemplary embodiment is the same as that exemplified in FIG. **4**, the description will once again refer to FIG. **4**.

As illustrated in FIG. **4**, the image forming device **10** is equipped with a transmitting unit **11**, a receiving unit **12**, a determining unit **13**, a saving unit **14**, a searching unit **15**, and an outputting unit **16**. The transmitting unit **11** transmits polling data querying the existence of print instruction information to the cloud print server **30**. The receiving unit **12** receives a generation notification reporting that print instruction information has been generated as well as print instruction information, including a user ID, from the cloud print server **30**, and receives print settings information, including a user ID, from the print settings server **40**. The determining unit **13** determines the type of data received by the receiving unit **12**. In the case in which the determining unit **13** determines that the data is print settings information, the saving unit **14** saves the print settings information in the storage unit **105** (see FIG. **2**). In the case in which the determining unit **13** determines that the data is print instruction information, the searching unit **15** searches the storage unit **105** for print settings information that includes the same service ID and user ID as the service ID and user ID included in the print instruction information. The outputting unit **16** outputs print data, including the print instruction information received by the receiving unit **12** and the print settings information found by the searching unit **15**, to the image forming unit **109** (see FIG. **2**) via the image processing unit **111** (see FIG. **2**). In the present exemplary embodiment, the image forming device **10** is provided as an example of a printer. Also, the receiving unit **12** is provided as an example of a first receiver and a second receiver, the searching unit **15** is provided as an example of a specifying unit, and the image forming unit **109** is provided as an example of a printing unit.

The client device **20** is equipped with a transmitting unit **21** and a receiving unit **22**. The transmitting unit **21** transmits login information relevant to logging in to the cloud print service and the print settings service, and in addition, transmits print settings for printing by the cloud print service to the cloud print server **30** and the print settings server **40**, and transmits print instructions giving instructions to print using the cloud print service to the cloud print server **30**. The receiving unit **22** receives responses to the information transmitted by the transmitting unit **21** from the cloud print server **30** and the print settings server **40**. In the present exemplary embodiment, the client device **20** is provided as an example of a print instructing device.

The cloud print server **30** is equipped with a transmitting unit **31**, a receiving unit **32**, an authenticating unit **33**, a holding unit **34**, and a generating unit **35**. The transmitting unit **31** transmits a generation notification reporting that print instruction information has been generated as well as print instruction information, including a user ID, to the image forming device **10**. The receiving unit **32** receives login information relevant to logging into the cloud print service, print settings available on the cloud print service for printing by the cloud print service, and print instructions giving instructions to print using the cloud print service from the client device **20**, and receives polling data querying the existence of print instruction information from the image forming device **10**. The authenticating unit **33** conducts authentication on the basis of the login information received by the receiving unit **32**. The holding unit **34** holds print settings received by the receiving unit **32**. The generating unit **35** generates and holds print instruction information on the basis of print instructions received by the receiving unit **32**. In the present exemplary embodiment, the cloud print server **30** is provided as an example of a print instruction information holding device. Also, the receiving unit **32** is provided as an example of a receiver, and the generating unit **35** is provided as an example of a holding unit.

The print settings server **40** is equipped with a transmitting unit **41**, a receiving unit **42**, an authenticating unit **43**, and a generating unit **45**. The transmitting unit **41** transmits print settings information, including a user ID, to the image forming device **10**. The receiving unit **42** receives login information relevant to logging into the print settings service and print settings unavailable on the cloud print service for printing by the cloud print service from the client device **20**. The authenticating unit **43** conducts authentication on the basis of login information received by the receiving unit **42**. The generating unit **45** generates and holds print settings information on the basis of print settings received by the receiving unit **42**. In the present exemplary embodiment, the print settings server **40** is provided as an example of a print settings information holding device.

FIG. **10** is a diagram exemplifying information held by the print settings server **40**. Among the information held by the print settings server **40**, first, there is print settings information generated by the generating unit **45**. In FIG. **10**, the value "staple-top-left" is specified for the parameter "finishings", and the value "reverse-portrait" is specified for the parameter "orientation-requested", as the print settings information. The former indicates stapling at the top-left as a finishing process, while the latter indicates that the print orientation is set to portrait in a reverse orientation. Also, among the information held by the print settings server **40**, there is information to be included in the print settings information and transmitted to the image forming device **10**. In FIG. **10**, values such as "http://cloud-a/print" and "http://cloud-b/print" are specified for the parameter "print-service-url", and values such as "user1_cloudA" and "user1_cloudB" are specified for the parameter "service-account" as such information. This information indicates that "http://cloud-a/print", "http://cloud-b/print", and the like are the URLs of cloud print services usable by the user who gave instructions to generate the print settings information, and that "user1_cloudA", "user1_cloudB", and the like are the respective user IDs for logging into these cloud print services.

FIG. **11** is a sequence diagram illustrating exemplary operation according to the third exemplary embodiment.

First, a client device **20** such as mobile equipment, following instructions from a user, accesses a print settings service and logs into the print settings service with a preregistered user ID. Specifically, on the client device **20**, the transmitting unit **21** transmits login information such as a user ID to the print settings server **40** (step **S801**). Subsequently, on the print settings server **40**, the receiving unit **42** receives the login information, the authenticating unit **43** conducts authentication on the basis thereof, and allows login if authentication succeeds (step **S802**). Note

that, although not illustrated in the drawings, information about whether or not login is allowed is passed from the authenticating unit **43** to the transmitting unit **41**, and sent in reply from the transmitting unit **41** to the client device **20**.

After that, the client device **20** configures print settings using the print settings service for printing by the cloud print service. In addition, the image forming device **10** to conduct the printing is also specified. Specifically, on the client device **20**, the transmitting unit **21** transmits print settings, including information indicating the image forming device **10** to conduct the printing, to the print settings server **40** (step S**803**).

Next, the print settings server **40** generates print settings information indicating the print settings, and transmits the print settings information, including a list of service IDs and a list of user IDs associated therewith, to the specified image forming device **10**. Specifically, on the print settings server **40**, the generating unit **45** generates print settings information (step S**804**), and the transmitting unit **41** transmits the print settings information, including service IDs and user IDs, to the specified image forming device **10** (step S**805**). Note that although the print settings information may be transmitting using any protocol, herein it is assumed that the print settings information is transmitting using the print protocol used to transmit the print instruction information. In addition, the print settings information to generate may be used in common for all cloud print services, or used with one or multiple cloud print services from among multiple registered cloud print services. In this case, combinations of a relevant service ID and a user ID are included in the respective print settings information.

As a result, the image forming device **10** receives data, and upon determining that the data is print settings information, saves the print settings information in a storage unit **105** such as an internal HDD (see FIG. **2**). Specifically, on the image forming device **10**, the receiving unit **12** receives data, the determining unit **13** determines whether or not the data is print settings information, and if the data is determined to be print settings information, the saving unit **14** saves the print settings information in the storage unit **105** (step S**806**).

In addition, the client device **20** also logs into a cloud print service with a preregistered user ID. Specifically, on the client device **20**, the transmitting unit **21** transmits login information such as a user ID to the cloud print server **30** (step S**807**). Subsequently, on the cloud print server **30**, the receiving unit **32** receives the login information, the authenticating unit **33** conducts authentication on the basis thereof, and allows login if authentication succeeds (step S**808**). Note that, although not illustrated in the drawings, information about whether or not login is allowed is passed from the authenticating unit **33** to the transmitting unit **31**, and sent in reply from the transmitting unit **31** to the client device **20**.

After that, the client device **20** gives instructions to print a document stored in the cloud print service on the same image forming device **10**. Specifically, on the client device **20**, the transmitting unit **21** transmits print instructions to print a document on the image forming device **10** specified in step S**803** to the cloud print server **30** (step S**812**). Subsequently, on the cloud print server **30**, the receiving unit **32** receives the print instructions, and the generating unit **35** generates print instruction information on the basis of the print instructions (step S**813**).

As a result, the cloud print server **30** notifies the image forming device **10** that print instruction information has been generated, and the image forming device **10** receives this notification and acquires print instruction information from the cloud print server **30**. Specifically, on the cloud print server **30**, the transmitting unit **31** transmits a generation notification reporting that print instruction information has been generated to the image forming device **10** (step S**814**). Subsequently, on the image forming device **10**, the receiving unit **12** receives the generation notification (step S**815**), and although not illustrated in the drawings, the transmitting unit **11** polls the cloud print server **30**. As a result, on the cloud print server **30**, the transmitting unit **31** transmits print instruction information, including a user ID, to the image forming device **10** (step S**816**). Subsequently, on the image forming device **10**, the receiving unit **12** receives the print instruction information (step S**817**). Note that in this case, since the determining unit **13** determines that the received data is print instruction information, the print instruction information is passed to the searching unit **15**.

Next, the image forming device **10** extracts the service ID and user ID from the acquired print instruction information, and searches the storage unit **105** for print settings information having the same combination of service ID and user ID. Specifically, the searching unit **15** searches user IDs included in print settings information stored in the storage unit **105** for the user ID included in the print instruction information passed from the determining unit **13** (step S**818**).

As a result, if print settings information having the service ID and user ID extracted from the print instruction information is found, the image forming device **10** conducts various printing using the print settings indicated by the print settings information. Specifically, the outputting unit **16** outputs print data, including the print instruction information received in step S**817** and the print settings information found in step S**818**, to the image forming unit **109** (see FIG. **2**) via the image processing unit **111** (see FIG. **2**) (step S**819**). Consequently, in the image forming unit **109**, a document image included in the print instruction information is printed using the print settings information.

Note that although this exemplary operation is configured to transmit print settings information to the image forming device **10** in advance, and subsequently print using a cloud print service, print settings information may also be generated using a print settings service every time print instructions are transmitted. The sequence in this case follows the sequence according to the first exemplary embodiment and the second exemplary embodiment.

[Fourth Exemplary Embodiment]

FIG. **12** is a diagram exemplifying an overall configuration according to the fourth exemplary embodiment of the present invention. An image forming device **10** is equipped with a document copying function, a function of scanning a document and generating scanned document image data, and a function of forming an image expressed by image data onto a sheet. A client device **20** receives information input by a user, and outputs information to the user. Server devices **30**, **40**, and **50** receive a request from the client device **20** and provide a service. The respective devices are connected to a communication link **60** that communicably connects devices to each other, and are capable of communicating with each other via the communication link **60**. Note that although FIG. **12** illustrates one image forming device, one client device, and three server devices, two or more image forming devices or client devices, and four or more server devices may also be connected to the communication link **60**.

Since the hardware configuration of an image forming device **10** according to the present exemplary embodiment is the same as that exemplified in FIG. **2**, description thereof

will be reduced or omitted. Also, the hardware configuration of a client device **20** and server devices **30** and **40** according to the present exemplary embodiment is likewise the same as that exemplified in FIG. **3**, or deducible from that exemplified in FIG. **3**, description thereof will be reduced or omitted. Furthermore, FIG. **3** may also be interpreted as a block diagram exemplifying a hardware configuration of the server device **50**. In this case, the CPU **201**, the main memory **202**, the HDD **203**, the communication I/F **204**, the display mechanism **205**, and the input device **206** will be respectively designated the CPU **501**, the main memory **502**, the HDD **503**, the communication I/F **504**, the display mechanism **505**, and the input device **506**.

Meanwhile, in the present exemplary embodiment, the cloud print server **30** is still used as the server device **30** in FIG. **12**, and the print settings server **40** is still used as the server device **40** in FIG. **12**. The cloud print server **30** and the print settings server **40** are the same as those discussed in the first exemplary embodiment, except for the following points. Namely, in the present exemplary embodiment, a user has a user ID for logging into each of multiple cloud print services, and is able to manage and print documents on the image forming device **10** using each of the multiple cloud print services. In addition, the user is assumed to also have a user ID for logging into a print settings service. Furthermore, assume that the user has registered an ID of a cloud print service that the user is able to use (a service ID) in association with a user ID for logging into that cloud print service.

In addition, in the present exemplary embodiment, a cloud service bridge **50** is used as the server device **50** in FIG. **12**. The cloud service bridge **50** is able to connect to multiple cloud print servers **30**, and is able to receive print instruction information from each cloud print server **30**.

In addition, the image forming device **10** is configured to be able to connect to a communication link **60** such as the Internet, and connecting to the cloud service bridge **50** is also possible.

FIG. **13** is a block diagram exemplifying a functional configuration of the image forming device **10**, the client device **20**, the cloud print server **30**, the print settings server **40**, and the cloud service bridge **50** according to the present exemplary embodiment.

As illustrated in FIG. **13**, the image forming device **10** is equipped with a transmitting unit **11**, a receiving unit **12**, and an outputting unit **16**. The transmitting unit **11** transmits various information related to printing to the cloud service bridge **50**. The receiving unit **12** receives print data, including print instruction information and print settings information, from the cloud service bridge **50**. The outputting unit **16** outputs print data received by the receiving unit **12** to the image forming unit **109** (see FIG. **2**) via the image processing unit **111** (see FIG. **2**). In the present exemplary embodiment, the image forming device **10** is provided as an example of a printer.

The client device **20** is equipped with a transmitting unit **21** and a receiving unit **22**. The transmitting unit **21** transmits login information relevant to logging in to the cloud print service and the print settings service, and in addition, transmits print settings for printing by the cloud print service to the cloud print server **30** and the print settings server **40**, and transmits print instructions giving instructions to print using the cloud print service to the cloud print server **30**. The receiving unit **22** receives responses to the information transmitted by the transmitting unit **21** from the cloud print server **30** and the print settings server **40**.

The cloud print server **30** is equipped with a transmitting unit **31**, a receiving unit **32**, an authenticating unit **33**, a holding unit **34**, and a generating unit **35**. The transmitting unit **31** transmits a generation notification reporting that print instruction information has been generated as well as print instruction information, including a user ID, to the cloud service bridge **50**. The receiving unit **32** receives login information relevant to logging into the cloud print service, print settings available on the cloud print service for printing by the cloud print service, and print instructions giving instructions to print using the cloud print service from the client device **20**, and receives polling data querying the existence of print instruction information from the cloud service bridge **50**. The authenticating unit **33** conducts authentication on the basis of the login information received by the receiving unit **32**. The holding unit **34** holds print settings received by the receiving unit **32**. The generating unit **35** generates and holds print instruction information on the basis of print instructions received by the receiving unit **32**. In the present exemplary embodiment, the cloud print server **30** is provided as an example of a print instruction information holding device.

The print settings server **40** is equipped with a transmitting unit **41**, a receiving unit **42**, an authenticating unit **43**, and a generating unit **45**. The transmitting unit **41** transmits print settings information, including a user ID, to the cloud service bridge **50**. The receiving unit **42** receives login information relevant to logging into the print settings service and print settings unavailable on the cloud print service for printing by the cloud print service from the client device **20**. The authenticating unit **43** conducts authentication on the basis of login information received by the receiving unit **42**. The generating unit **45** generates and holds print settings information on the basis of print settings received by the receiving unit **42**. In the present exemplary embodiment, the print settings server **40** is provided as an example of a print settings information holding device.

The cloud service bridge **50** is equipped with a transmitting unit **51**, a receiving unit **52**, a determining unit **53**, a saving unit **54**, and a searching unit **55**. The transmitting unit **51** transmits polling data querying the existence of print instruction information to the cloud print server **30**, and transmits print data, including print instruction information received by the receiving unit **52** and print settings information found by the searching unit **55**, to the image forming device **10**. The receiving unit **52** receives a generation notification reporting that print instruction information has been generated as well as print instruction information, including a user ID, from the cloud print server **30**, and receives print settings information, including a user ID, from the print settings server **40**. The determining unit **53** determines the type of data received by the receiving unit **52**. In the case in which the determining unit **53** determines that the data is print settings information, the saving unit **54** saves the print settings information in the HDD **503**. In the case in which the determining unit **53** determines that the data is print instruction information, the searching unit **55** searches the HDD **503** for print settings information that includes the same service ID and user ID as the service ID and user ID included in the print instruction information. In the present exemplary embodiment, the cloud service bridge **50** is provided as an example of a print control device. Also, the transmitting unit **51** is provided as an example of a transmitter, the receiving unit **52** is provided as an example of a receiver and an acquiring unit, and the searching unit **55** is provided as an example of a specifying unit.

Note that since the information held by the print settings server **40** is the same as that exemplified in FIG. **10**, description herein will be reduced or omitted.

FIG. **14** is a sequence diagram illustrating exemplary operation according to the fourth exemplary embodiment.

First, a client device **20** such as mobile equipment, following instructions from a user, accesses a print settings service and logs into the print settings service with a preregistered user ID. Specifically, on the client device **20**, the transmitting unit **21** transmits login information such as a user ID to the print settings server **40** (step S**821**). Subsequently, on the print settings server **40**, the receiving unit **42** receives the login information, the authenticating unit **43** conducts authentication on the basis thereof, and allows login if authentication succeeds (step S**822**). Note that, although not illustrated in the drawings, information about whether or not login is allowed is passed from the authenticating unit **43** to the transmitting unit **41**, and sent in reply from the transmitting unit **41** to the client device **20**.

After that, the client device **20** configures print settings using the print settings service for printing by the cloud print service. In addition, the image forming device **10** to conduct the printing is also specified. Specifically, on the client device **20**, the transmitting unit **21** transmits print settings, including information indicating the image forming device **10** to conduct the printing, to the print settings server **40** (step S**823**).

Next, the print settings server **40** generates print settings information indicating the print settings, and transmits the print settings information, including a list of service IDs and a list of user IDs associated therewith, to the cloud service bridge **50**. Specifically, on the print settings server **40**, the generating unit **45** generates print settings information (step S**824**), and the transmitting unit **41** transmits the print settings information, including service IDs and user IDs, to the cloud service bridge **50** (step S**825**). Note that although the print settings information may be transmitting using any protocol, herein it is assumed that the print settings information is transmitting using the print protocol used to transmit the print instruction information. Also, the print settings information to be generated is the same as that discussed in the third exemplary embodiment.

As a result, the cloud service bridge **50** receives data, and upon determining that the data is print settings information, saves the print settings information in an internal HDD **503**. Specifically, on the cloud service bridge **50**, the receiving unit **52** receives data, the determining unit **53** determines whether or not the data is print settings information, and if the data is determined to be print settings information, the saving unit **54** saves the print settings information in the HDD **503** (step S**826**).

In addition, the client device **20** also logs into a cloud print service with a preregistered user ID. Specifically, on the client device **20**, the transmitting unit **21** transmits login information such as a user ID to the cloud print server **30** (step S**827**). Subsequently, on the cloud print server **30**, the receiving unit **32** receives the login information, the authenticating unit **33** conducts authentication on the basis thereof, and allows login if authentication succeeds (step S**828**). Note that, although not illustrated in the drawings, information about whether or not login is allowed is passed from the authenticating unit **33** to the transmitting unit **31**, and sent in reply from the transmitting unit **31** to the client device **20**.

After that, the client device **20** gives instructions specifying the image forming device **10** to print a document stored in the cloud print service. Specifically, on the client device **20**, the transmitting unit **21** transmits print instructions to print a document on the image forming device **10** to the cloud print server **30** (step S**832**). Subsequently, on the cloud print server **30**, the receiving unit **32** receives the print instructions, and the generating unit **35** generates print instruction information on the basis of the print instructions (step S**833**).

As a result, the cloud print server **30** notifies the cloud service bridge **50** that print instruction information has been generated, and the cloud service bridge **50** receives this notification and acquires print instruction information from the cloud print server **30**. Specifically, on the cloud print server **30**, the transmitting unit **31** transmits a generation notification reporting that print instruction information has been generated to the cloud service bridge **50** (step S**834**). Subsequently, on the cloud service bridge **50**, the receiving unit **52** receives the generation notification (step S**835**), and although not illustrated in the drawings, the transmitting unit **51** polls the cloud print server **30**. As a result, on the cloud print server **30**, the transmitting unit **31** transmits print instruction information, including a user ID, to the cloud service bridge **50** (step S**836**). Subsequently, on the cloud service bridge **50**, the receiving unit **52** receives the print instruction information (step S**837**). Note that in this case, since the determining unit **53** determines that the received data is print instruction information, the print instruction information is passed to the searching unit **55**.

Next, the cloud service bridge **50** extracts the service ID and user ID from the acquired print instruction information, and searches the HDD **503** for print settings information having the same combination of service ID and user ID. Specifically, the searching unit **55** searches service IDs and user IDs included in print settings information stored in the HDD **503** for the service ID and user ID included in the print instruction information passed from the determining unit **53** (step S**838**).

As a result, if print settings information having the service ID and user ID extracted from the print instruction information is found, the cloud service bridge **50** merges the print settings information into the print instruction information acquired from the cloud print service, and transmits the merged print instruction information to the specified image forming device **10** for printing. Specifically, the transmitting unit **51** transmits print data, including the print instruction information received in step S**837** and the print settings information found in step S**838**, to the image forming device **10** (step S**839**). Subsequently, although not illustrated in FIG. **14**, on the image forming device **10**, the receiving unit **12** receives the print data, and the outputting unit **16** outputs the print data to the image forming unit **109** (see FIG. **2**) via the image processing unit **111** (see FIG. **2**). Consequently, in the image forming unit **109**, a document image included in the print instruction information is printed using the print settings information.

Note that in this exemplary operation, used print settings information may be deleted, or saved until user instructions are given.

Also, although this exemplary operation is configured to transmit print settings information to the cloud service bridge **50** in advance, and subsequently print using a cloud print service, print settings information may also be generated using a print settings service every time print instructions are transmitted. The sequence in this case follows the sequence according to the first exemplary embodiment and the second exemplary embodiment.

[Fifth Exemplary Embodiment]

Since an overall configuration according to the fifth exemplary embodiment of the present invention is the same

as that exemplified in FIG. **1**, description thereof will be reduced or omitted. Also, since the hardware configuration of an image forming device **10** according to the present exemplary embodiment is likewise the same as that exemplified in FIG. **2**, description thereof will be reduced or omitted. Furthermore, the hardware configuration of a client device **20** and server devices **30** and **40** according to the present exemplary embodiment is likewise the same as that exemplified in FIG. **3**, or deducible from that exemplified in FIG. **3**, description thereof will be reduced or omitted.

Meanwhile, in the present exemplary embodiment, the cloud print server **30** is used as the server device **30** in FIG. **1**, and the cloud service bridge **50** is used as the server device **40** in FIG. **1**. Since the cloud print server **30** has been discussed in the first exemplary embodiment, description herein will be reduced or omitted. Also, the cloud service bridge **50** according to the present exemplary embodiment includes the functionality of the print settings server **40** according to the fourth exemplary embodiment.

FIG. **15** is a block diagram exemplifying a functional configuration of the image forming device **10**, the client device **20**, the cloud print server **30**, and the cloud service bridge **50** according to the present exemplary embodiment.

As illustrated in FIG. **15**, the image forming device **10** is equipped with a transmitting unit **11**, a receiving unit **12**, and an outputting unit **16**. The transmitting unit **11** transmits various information related to printing to the cloud service bridge **50**. The receiving unit **12** receives print data, including print instruction information and print settings information, from the cloud service bridge **50**. The outputting unit **16** outputs print data received by the receiving unit **12** to the image forming unit **109** (see FIG. **2**) via the image processing unit **111** (see FIG. **2**). In the present exemplary embodiment, the image forming device **10** is provided as an example of a printer.

The client device **20** is equipped with a transmitting unit **21** and a receiving unit **22**. The transmitting unit **21** transmits login information relevant to logging in to each cloud print service, and in addition, transmits print settings for printing by the cloud print service to each server device, and transmits print instructions giving instructions to print using the cloud print service to the cloud print server **30**. The receiving unit **22** receives responses to the information transmitted by the transmitting unit **21** from each server device.

The cloud print server **30** is equipped with a transmitting unit **31**, a receiving unit **32**, an authenticating unit **33**, a holding unit **34**, and a generating unit **35**. The transmitting unit **31** transmits a generation notification reporting that print instruction information has been generated as well as print instruction information, including a user ID, to the cloud service bridge **50**. The receiving unit **32** receives login information relevant to logging into the cloud print service, print settings available on the cloud print service for printing by the cloud print service, and print instructions giving instructions to print using the cloud print service from the client device **20**, and receives polling data querying the existence of print instruction information from the cloud service bridge **50**. The authenticating unit **33** conducts authentication on the basis of the login information received by the receiving unit **32**. The holding unit **34** holds print settings received by the receiving unit **32**. The generating unit **35** generates and holds print instruction information on the basis of print instructions received by the receiving unit **32**. In the present exemplary embodiment, the cloud print server **30** is provided as an example of a print instruction information holding device.

The cloud service bridge **50** is equipped with a transmitting unit **51**, a receiving unit **52**, an authenticating unit **56**, a generating unit **57**, a saving unit **58**, and a searching unit **59**. The transmitting unit **51** transmits polling data querying the existence of print instruction information to the cloud print server **30**, and transmits print data, including print instruction information received by the receiving unit **52** and print settings information found by the searching unit **59**, to the image forming device **10**. The receiving unit **52** receives login information relevant to logging into the cloud service bridge **50** and print settings unavailable on the cloud print service for printing by the cloud print service from the client device **20**, and receives a generation notification reporting that print instruction information has been generated as well as print instruction information, including a user ID, from the cloud print server **30**. The authenticating unit **56** conducts authentication on the basis of login information received by the receiving unit **52**. The generating unit **57** generates print settings information, including a user ID, on the basis of print settings received by the receiving unit **52**. The saving unit **58** saves print settings information generated by the generating unit **57** in the HDD **503**. The searching unit **59** searches the HDD **503** for print settings information that includes the same service ID and user ID as the service ID and user ID included in the print instruction information received by the receiving unit **52**. In the present exemplary embodiment, the cloud service bridge **50** is provided as an example of a print settings information holding device and a print control device. Also, the transmitting unit **51** is provided as an example of a transmitter, the receiving unit **52** is provided as an example of a receiver and an acquiring unit, and the searching unit **59** is provided as an example of a specifying unit.

Note that since the information held by the cloud service bridge **50** is the same as that exemplified in FIG. **10**, description herein will be reduced or omitted.

FIG. **16** is a sequence diagram illustrating exemplary operation according to the fifth exemplary embodiment.

First, a client device **20** such as mobile equipment, following instructions from a user, accesses the cloud service bridge **50** and logs in with a preregistered user ID. Specifically, on the client device **20**, the transmitting unit **21** transmits login information such as a user ID to the cloud service bridge **50** (step S**841**). Subsequently, on the cloud service bridge **50**, the receiving unit **52** receives the login information, the authenticating unit **56** conducts authentication on the basis thereof, and allows login if authentication succeeds (step S**842**). Note that, although not illustrated in the drawings, information about whether or not login is allowed is passed from the authenticating unit **56** to the transmitting unit **51**, and sent in reply from the transmitting unit **51** to the client device **20**.

After that, the client device **20** configures print settings using the print settings service on the cloud service bridge **50** for printing by the cloud print service. In addition, the image forming device **10** to conduct the printing is also specified. Specifically, on the client device **20**, the transmitting unit **21** transmits print settings, including information indicating the image forming device **10** to conduct the printing, to the cloud service bridge **50** (step S**843**).

Next, the cloud service bridge **50** generates print settings information indicating the print settings, and saves the print settings information, including a list of service IDs and a list of user IDs associated therewith, in an internal HDD **503**. Specifically, on the cloud service bridge **50**, the generating

unit **57** generates print settings information (step S**844**), and the saving unit **58** saves the print settings information in the HDD **503** (step S**845**).

In addition, the client device **20** also logs into a cloud print service with a preregistered user ID. Specifically, on the client device **20**, the transmitting unit **21** transmits login information such as a user ID to the cloud print server **30** (step S**847**). Subsequently, on the cloud print server **30**, the receiving unit **32** receives the login information, the authenticating unit **33** conducts authentication on the basis thereof, and allows login if authentication succeeds (step S**848**). Note that, although not illustrated in the drawings, information about whether or not login is allowed is passed from the authenticating unit **33** to the transmitting unit **31**, and sent in reply from the transmitting unit **31** to the client device **20**.

After that, the client device **20** gives instructions specifying the image forming device **10** to print a document stored in the cloud print service. Specifically, on the client device **20**, the transmitting unit **21** transmits print instructions to print a document on the image forming device **10** to the cloud print server **30** (step S**852**). Subsequently, on the cloud print server **30**, the receiving unit **32** receives the print instructions, and the generating unit **35** generates print instruction information on the basis of the print instructions (step S**853**).

As a result, the cloud print server **30** notifies the cloud service bridge **50** that print instruction information has been generated, and the cloud service bridge **50** receives this notification and acquires print instruction information from the cloud print server **30**. Specifically, on the cloud print server **30**, the transmitting unit **31** transmits a generation notification reporting that print instruction information has been generated to the cloud service bridge **50** (step S**854**). Subsequently, on the cloud service bridge **50**, the receiving unit **52** receives the generation notification (step S**855**), and although not illustrated in the drawings, the transmitting unit **51** polls the cloud print server **30**. As a result, on the cloud print server **30**, the transmitting unit **31** transmits print instruction information, including a user ID, to the cloud service bridge **50** (step S**856**). Subsequently, on the cloud service bridge **50**, the receiving unit **52** receives the print instruction information (step S**857**). Note that this print instruction information is passed to the searching unit **59**.

Next, the cloud service bridge **50** extracts the service ID and user ID from the acquired print instruction information, and searches the HDD **503** for print settings information having the same combination of service ID and user ID. Specifically, the searching unit **59** searches service IDs and user IDs included in print settings information stored in the HDD **503** for the service ID and user ID included in the print instruction information passed from the receiving unit **52** (step S**858**).

As a result, if print settings information having the service ID and user ID extracted from the print instruction information is found, the cloud service bridge **50** merges the print settings information into the print instruction information acquired from the cloud print service, and transmits the merged print instruction information to the specified image forming device **10** for printing. Specifically, the transmitting unit **51** transmits print data, including the print instruction information received in step S**857** and the print settings information found in step S**858**, to the image forming device **10** (step S**859**). Subsequently, on the image forming device **10**, the receiving unit **12** receives the print data, and the outputting unit **16** outputs the print data to the image forming unit **109** (see FIG. **2**) via the image processing unit **111** (see FIG. **2**) (step S**860**). Consequently, in the image forming unit **109**, a document image included in the print instruction information is printed using the print settings information.

Note that in this exemplary operation, used print settings information may be deleted, or saved until user instructions are given.

Also, although this exemplary operation is configured to transmit print settings information to the cloud service bridge **50** in advance, and subsequently print using a cloud print service, print settings information may also be generated using a print settings service every time print instructions are transmitted. The sequence in this case follows the sequence according to the first exemplary embodiment and the second exemplary embodiment.

The foregoing thus describes the first to fifth exemplary embodiments of the present invention. Note that in these exemplary embodiments, although a user ID is used as an identifier for associating print instruction information with print settings information, the configuration is not limited thereto, and an arbitrary number may also be used as an identifier. In this case, an arbitrary number may be input when giving instructions to print to the cloud print server **30**, for example. An arbitrary number may also be input when generating print settings information. It is then sufficient to search for print instruction information and print settings information with the same number. Alternatively, a print instruction information ID that identifies print instruction information may be generated as an identifier on the cloud side when generating print instruction information, and this identifier may be embedded into the print settings information.

Also, in these exemplary embodiments, although the cloud print server **30** is configured to transmit print instruction information to the image forming device **10** when polled from the image forming device **10**, the cloud print server **30** may also be configured to transmit print instruction information to the image forming device **10** without waiting for polling.

The foregoing description of the exemplary embodiments of the present invention has been provided for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Obviously, many modifications and variations will be apparent to practitioners skilled in the art. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications, thereby enabling others skilled in the art to understand the invention for various embodiments and with the various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the following claims and their equivalents.

What is claimed is:

1. A printer comprising:

a first receiver configured to receive, from any of at least one print instruction information holding device that holds print instruction information giving instructions to print, specific print instruction information associated with a first identifier and instructing the printer to print;

a second receiver configured to receive, from a print settings information holding device that holds print settings information indicating settings for printing, specific print settings information associated with a second identifier and indicating settings for printing by the printer;

a specifying unit configured to specify, on the basis of the first identifier and the second identifier, the specific

print settings information as print settings information corresponding to the specific print instruction information; and

a printing unit configured to use the specific print settings information to conduct printing based on the specific print instruction information, wherein

the first receiver is configured to receive the specific print instruction information associated with the first identifier that indentifies a printer instructor who instructs the printer to print, and

the second receiver is configured to receive the specific print settings information associated with the second identifier that identifies a print configurator who configures settings for printing by the printer.

2. The printer according to claim **1**, wherein

the first receiver receives, from a specific print instruction information holding device among a plurality of print instruction information holding devices that hold the print instruction information, the specific print instruction information associated with the first identifier that identifies a print instructor who instructs the printer to print, and in addition, identifies the specific print instruction information holding device, and

the second receiver receives the specific print settings information associated with the second identifier that identifies a print configurator who configures settings for printing by the printer, and in addition, identifies at least one print instruction information holding device among the plurality of print instruction information holding devices.

3. The printer according to claim **1**, wherein

in the case of not specifying the specific print settings information, the specifying unit waits to receive the specific print settings information, and after the specific print settings information is received, specifies the specific print settings information as print settings information corresponding to the specific print instruction information.

4. A printing method conducted by a printer, the printing method comprising:

receiving, from any of at least one print instruction information holding device that holds print instruction information giving instructions to print, specific print instruction information associated with a first identifier and instructing the printer to print;

receiving, from a print settings information holding device that holds print settings information indicating settings for printing, specific print settings information associated with a second identifier and indicating settings for printing by the printer;

specifying, on the basis of the first identifier and the second identifier, the specific print settings information as print settings information corresponding to the specific print instruction information; and

using the specific print settings information to conduct printing based on the specific print instruction information, wherein

the specific print instruction information associated with the first identifier identifies a printer instructor who instructs the printer to print, and

the specific print settings information associated with the second identifier identifies a print configurator who configures settings for printing by the printer.

5. A non-transitory computer readable medium storing a program causing a computer to execute a process for realizing printing by a printer, the process comprising:

receiving, from any of at least one print instruction information holding device that holds print instruction information giving instructions to print, specific print instruction information associated with a first identifier and instructing the printer to print;

receiving, from a print settings information holding device that holds print settings information indicating settings for printing, specific print settings information associated with a second identifier and indicating settings for printing by the printer;

specifying, on the basis of the first identifier and the second identifier, the specific print settings information as print settings information corresponding to the specific print instruction information; and

controlling a print mechanism of the printer to use the specific print settings information to conduct printing based on the specific print instruction information, wherein

the specific print instruction information associated with the first identifier identifies a print instructor who instructs the printer to print, and

the specific print settings information associated with the second identifier identifies a print configurator who configures settings for printing by the printer.

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